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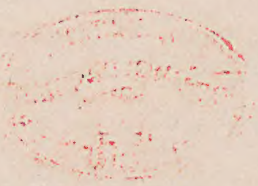

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Agriculture.

THE WOOL INDUSTRY FROM A BUYER'S STANDPOINT

No. 3.

By F E. STURMFELS.

If the judicious classing of wool is essential in order that it may be presented to the buyer in the best marketable condition, the skirting, if anything, is of still more importance, since in attending to it thoroughly we get a well-classed wool, practically sorted, and free from all its inferior parts.

The percentage of skirting to be done naturally varies with the class of wool which has to be handled; for instance, a well, even-grown fleece, free from burrs or other vegetable matters, will only require trimming round the fleece and the lower skirts, taking off where the difference in fineness is apparent, while faulty fleeces, burry and seedy, as well as tender in the backs, should receive drastic handling, and all parts of similar appearance and quality be kept by themselves; in fact, as regards the latter case, it means practically breaking up the fleece into several grades.

HOW TO SKIRT.

The fleece having been spread out on the sorting table, as previously explained (the bellies having already been separated in the usual way by the shearer), the points or dark parts should be trimmed all round the fleece and thrown into the locks; then the lower parts of the breeches should be separated by effecting the division with the two hands where the line of demarcation is fully visible from the cleaner appearance of the upper parts; this goes into the second pieces, if two grades are decided upon, but if only one quality is resorted to, on account of the smallness of the clip, they should be simply called and branded "pieces," and the work practically finishes here. The fleece is then rolled and, the grade being determined, is put in its respective bin; but when skirting is pushed further, the first pieces, which are usually cleaner, bolder, and not so fine as the body of the fleece or fleece proper, will now require to be separated where the finer staple shows a decided contrast. In this way a uniform "first pieces" of good length and strength, and sometimes lighter in condition than the fleece itself, is produced, which in many cases will realise as much as if not more than the fleece. A good average well-grown wool will not require further handling. The fleece must now be folded, rolled, and put in its respective bin. No tying of the fleeces is required, the old style of using string being now quite obsolete, and, as manufacturers had to take every particle out of the wool before it was allowed to go into the machines, it involved an unnecessary expense on both sides.

In the Western and North-western districts of Queensland, where the fibre naturally runs fine, in time, through climatic influences, it often occurs that the backs are mushy and sometimes dusty, in which case it is found advisable to have them taken entirely out and classed separately; necks, being of uniform length, usually dry and of good yielding quality, also are frequently kept by themselves, but this can only be done on large stations.

Our previous remarks apply mostly to grazing farmers and selectors, but when cutting out does not exceed forty or fifty bales it would be preferable to class by sexes, and brand as follows:—"H" for hoggets, "E" for ewes, "W" for wethers; and give due attention to our remarks about thorough skirting.

TECHNICAL TERMS USED IN THE TRADE TO DESCRIBE THE DIFFERENT GRADES OF WOOL WITH THEIR QUALITIES AND DEFECTS.

Combing.—A wool of such a length as will, after carding, bear the strain of going through the process of combing.

Clothing.—A wool not necessarily deficient in the qualities of a combing wool, but one of fine texture and possessing milling or felting qualities from its close serrations.

Staple.—Part of a fleece often terminating in a point more or less pronounced—partaking of the nature of a curl.

Shafty.—A square, deep, and even staple. Character shows true, free evenness of staple, with thorough soundness.

Moity.—A term applied to seedy wools; but

Seedy is now more generally used. It denotes a fleece or part of a fleece containing more or less vegetable matters, such as real grass seeds or tips of grasses.

Burry.—Denotes that the wool contains either trefoil, Bathurst or Noogoora burrs.

Mushy.—A poor, tender, and open staple, of lean fibres and inferior quality.

Tender.—A wool showing a decided break in one part of the staple, caused by want of feed during a period of its growth or through disease.

Skirty.—Wool which has either not been skirted or improperly skirted.

Earthy and (or) Sandy.—A fleece containing a decided amount of soil, dust, or sand, or both.

Wasty.—A wool containing earth, sand, or yolk, seeds, burrs, or all of them.

Yolky.—A wool containing a large percentage of natural fatty secretion of the sheep.

Dusty.—Slightly earthy.

Dingy.—Of dull colour, but without discolouration.

Stained.—Parts discoloured by urine.

Canary Stain.—Slight discolouration of parts of the fleeces, caused probably through heat, after heavy rains; by no means prejudicial to the staple, except that the wool can only be used for dark dyes.

DO PHOSPHATES EXHAUST THE SOIL?

PROFESSOR LOWRIE, in answer to this question, says: This is a question which has been put to me again and again in the country, and I always endeavour to answer it in a way that will give confidence. It is, of course, quite a mistake to consider that the application of manure exhausts the land by stimulating it. You will exhaust it if you continue cropping it year after year without returning to it some of the plant food the crops take out of it. If you manure judiciously, there is not the slightest fear of the land being rendered ultimately barren. This can be proved to the greatest sceptic by the work of Lawes and Gilbert, at Rothampstead, where every year for 60 years a crop of wheat has been put in. The average obtained has remained from 40 bushels to 43 bushels.

The land gets a heavy dressing of phosphates, nitrogen, and potash, and it is better than when they started. The only thing is that it is rather more difficult to keep clean of weeds.

People who have axes to grind are selling guano or other manures, and they tell the people that if they continue using super. alone the land will become barren. To a certain extent it is true, because by taking heavy crops year after year, and only adding phosphates, you might exhaust the nitrates and potash, but then all you have to do is to add these also. You can easily find out what is required by a few experiments. All the same, I know of one place where five crops were grown in 12 years on the same land with nothing but superphosphate, and they got an average of 20 bushels.

The rainfall is 17 inches. In answer to the question, "Does the manuring for wheat spoil the grass afterwards?" Professor Lowrie said: Quite the contrary. If you miss manuring a turn of the drill in sowing the crop, you can see where it was next year by the comparative shortness of the grass. Phosphates make the trefoil grow rather heavily, and that, from the point of view of the sheep man, is a disadvantage, but they make the other feed grow also.

DOES GOAT-KEEPING PAY.

An exchange on this point says:—Goat-keeping pays excellently under circumstances where conditions are not favourable to grazing cows.

There are several kinds of goats, but the three chief varieties are—Good, bad, and very bad. Pure Angoras are excellent milkers, and Angoras crossed with common varieties produce really valuable animals, more especially if care be taken in the matter of choosing good milkers for breeding from.

Goat's milk has been known to give a butter test equal to 5·4.

Goats want good feed, and to be allowed to forage in clean places where access cannot be had to undesirable feed.

Goat's milk does not possess any characteristic flavour if the animals be prevented from eating gum leaves, bark, and other strong tasting fodders. It is the feed they eat that imparts the flavour to milk from goats allowed to wander among bushes and undergrowth of various kinds. If properly fed, the milk from goats is as sweet as that from cows, and, furthermore, it is richer and more strengthening than any other, being specially adapted for young children and invalids.

PROFITS ON GOATS.

Uncle Sam's Department of Agriculture (says the *Florida Agriculturist*), in seeking out new fields of husbandry for the American farmer, has completed a curious and interesting investigation into the possibilities of an industry highly profitable abroad, but ignored in this country—that of goat-raising for skins, fleece, milk, cheese, and by-products. In a report the department offers this slighted industry as a means by which a farmer can increase his prosperity and incidentally enrich his soil without cost. The department says that the conditions of climate, land, and labour in most of the States of the Union afford almost unlimited natural facilities for the successful prosecution of the industry.

We use in our manufactures a constantly increasing amount of goat skins, but we produce comparatively none ourselves. Last year over 32,000 tons, or 65,000,000 lb., of goat skins were brought in, chiefly at New York; and the average price in New York was 40 cents per lb., or a total value of 26,000,000 dollars. At 4 lb. to the skin, the average weight of dry skins, it requires the slaughter of 16,226,700 goats and kids to yield the skins imported last year. This represents live flocks of foreign goats aggregating from 25,000,000 to 30,000,000 for our present supply of marketable goat skins alone. If all the goats in this country were kept solely to supply skins for market, they would fail to supply even an insignificant fraction of the present demand.

In goat-keeping on a large scale it is not alone the skins and fleeces that enter into the profit account. If the skins imported last year represented native stock, there would have been taken additionally into our home market and profit account nearly the whole animal—the flesh, tallow, bones, hoofs, horns, &c., which together would constitute more than half of the entire marketable value. Besides, there is to be derived from the mature females

during much of their lives a big value in milk for market or household uses or for conversion into the most saleable varieties of cheese, such as the Roquefort, Mont D'Or, Le Sassenage, and Levroux, of France and Switzerland. So fully is the goat available as a dairy animal when bred to that object that in Europe it is sententiously called "the poor man's cow," because of the combination of value with economy of keeping.

The total number of goats in the United States is only about 500,000, and one-half of these are in Texas. One-half of the total number, also, are of Angora fleece-bearing stock, confined chiefly to Texas, Oregon, New Mexico, California, Colorado, and Nevada. Few, if any, goats in the United States are raised for their skins.

The cost of keeping goats is less than for any other animal. They graze upon coarse herbs that are not eaten by any other stock, such as ironweed, dock, mullein, briars, buds, and broken sprouts. The wool of the Angora variety possesses the highest felting qualities. The average fleeces from mature Americanised Angora bucks weigh from 6 to 7 lb., and those from the ewes from 3 to 4 lb. The flesh of the crosses is accounted superior to mutton.

The ease with which all breeds of goats can be kept fits them for many mountainous portions of our country, where sheep cannot be sustained to advantage, while their ability and disposition to defend themselves against dogs give to them another great advantage over sheep. They are free from all diseases to which sheep are liable, are hardy and prolific, and experience has proved that they are adaptable to all parts of the United States. The feed of one cow will keep twelve goats. Cows must have certain food or they will not thrive. Goats will eat anything almost, and still do well, and they have this great advantage also: That their milk is not in any way affected by their diet.

The goat is a reliable and lifelong botanical scavenger, and can be depended upon to destroy the many undesirable products of cultivated and fallow lands—the abundant and persistent weedy vegetation, which so incessantly besets the cultivated crops. Other ruminating domestic animals prefer the cereals and grasses that depend upon the labour of the farmer. What these reject, goats prefer, and cheerfully pass by growing grass and grain for a constant dessert of wild carrot, burdock, mullein, thistle, or cactus. Goats thus voluntarily clean fields of their vegetative refuse before it ripens and scatters its seeds, and so thoroughly is this done that the latent seeds of valuable grasses, improving the chance thus given them to sprout and thrive, often follow the second or third year of goat pasturage with a uniform carpet, clean and even as if made to order. The value of the goat as a brush-cleaner can hardly be over-estimated.

The goat thrives in all climates, except that of the Polar regions. Long-lived, hardy, agile, and enterprising, it does well, if unconfined, in heat or cold, on mountains or plain. But it naturally prefers rough, rocky, bushy, wild, and elevated land. As to climate alone, most of the entire area of the United States is favourable to the goat family generally; and much of the Pacific coast, the south-west and the south, to the long-fleeced varieties particularly. And in this country it seems that whenever there is a suitable climate there are also suitable uncultivated lands. Over 42 per cent. of the lands in farms in the United States is unimproved, amounting to over 265,000,000 acres, against 375,000,000 acres improved. Thus is presented a vast field for selection of favoured localities in every part of the country, and much of the field especially invites the primitive occupation of herding, which precedes and prepares the way for agriculture, with inestimable benefit to the soil. In the aggregate, millions of acres of land, at present poor, rough, rocky, and bushy, distributed through nearly all the States, call for subjection and enrichment through animal occupation, preferably of the goat. They will furnish in abundance such foliage as is suitable and preferable for goats; and, under such conditions, whatever profit can be derived from herding goats will come near being a total profits Wherever foul land is regularly pastured by goats for a few years it becomes clean, weedless, and bushless, and, being evenly fertilised by them also, it usually runs naturally into nutritious grasses.

THE PRINCIPLES OF SHEEP-BREEDING.

No. 6.

By J. S. HERMANN SCHMIDT.

THE STAPLE.

On a former occasion I have mentioned how the wool fibres, whilst growing up from the skin, conglomerate into bunches of different size, called staples. They exhibit great difference in form, the result of the qualities and the structure of the single fibres of which the bunches or staples are composed. We can thus form an approximately correct estimate of the qualities of the single fibres by taking notice of the shape and the whole external appearance of the staples. Besides the qualities of the fibres themselves, there are two factors which exercise an influence on the manner in which the fibres arrange themselves into staples, viz.:—1st, the yolk; 2nd, the density of their growth.

Before treating on the shape of the staples, let me consider these two subjects first.

The Yolk.—The fatty substance found in any ordinary fleece is a mixture of a kind of soft soap and two different kinds of fat, elainerine and stearinerine. The skin contains, as I have described before, two kinds of glands –the sudoriparous or sweat glands, situated in the lower portion of the skin; and the sebaceous or fat glands, placed near the sheath of the shaft of the fibre.

The sudoriparous glands are not so numerous and so well developed in the skin of sheep as they are in that of mankind. Sheep do not actually sweat, but, whilst there is no visible perspiration, the sweat glands nevertheless produce water, which, however, evaporates very rapidly. The sweat carries with it from the sweat glands ammonia and certain minerals, especially potash salts, which being in solution are absorbed by capillary attraction and brought near the wool fibres. The fat glands, of which there are mostly two to each fibre, produce a mixture of elainerine, an oily substance, and stearinerine, a more solid fat. These fats are partially turned into a kind of soft soap by the potash salts produced by the sweat.

The quantity of potash brought up from the skin through the agency of the sweat glands is so large that the recovery of it from the washings of sheep or wool has become an important industry in districts where large quantities of sheep or wool are washed. The potash combines with an animal fatty acid, and forms a substance called sudorate of potash. (Bowman.)

Yolk is therefore a mixture of a kind of soft soap, sudorate of potash, soluble in cold water, and thus easily washed out, and of other fatty matters more or less difficult to dissolve in soapy solutions.

Coarse-woolled sheep produce less yolk than merinos.

The quantity and the quality of the yolk depend upon—Firstly, the quantity of fat glands in the skin in proportion to the number of fibres on the square inch (density); hence the more fibres the more yolk; secondly, on the quantity and the quality of the food consumed; and thirdly, on the individual nature of the animal.

In Australia we have mostly grass-fed sheep. Their yolk is more fluid, and there is less of it than in the wool of stable-fed animals.

The influence of the various kinds of grain, of root crops, of green fodder plants, &c., on the quantity and the quality of the yolk is so different that, in some cases, it is possible to say with a considerable amount of certainty that these or those sheep, as the case may be, have been fed with leguminous seeds (peas, beans, lupines, &c.), because they have a peculiar, sticky yolk, for which the scourer will not bless the producer!

In countries where the sheep are fed with different kinds of food during certain periods of the year, those periods are recorded in the length of the staple by the difference in the consistency and the colour of the yolk. A diet of potatoes renders the yolk light-coloured and oily; that of beet root imparts to it a look as if it had been sprinkled over with a yellow dust.

Fresh lucerne produces a light-coloured fluid yolk, which shows the character of the wool very clearly, &c.

Large quantities of yolk in a fleece may also be a matter of individuality. Some sheep will produce much yolk even if they are poorly fed. Some, as I have had ample opportunities of noticing, may be, so to speak, skin and bone, and still produce more yolk than wool. The introduction into a flock of this tendency to produce large quantities of heavy, sticky yolk has to be debited, in most cases, to the use of Negretti or Vermont blood, especially the latter; and great care should be exercised in avoiding this undesirable concomitant. It is with the aid of this yolk that the single wool fibres are able to join others in forming regular bunches or staples of wool whilst growing up from the skin, provided they are sufficiently densely grown, so as to permit a perfect leaning-on of the fibres to each other.

Some of the Victorian breeds produce small quantities of a light-coloured fluid yolk; so do all coarse-woolled sheep, likewise the Rambouillets and many other French breeds.

Some districts of Australia, especially the North-western parts of Queensland, are characteristic in this respect, and it may be presumed that climate and pasture will gradually produce a tendency that way in the later generations, provided they continue to live under the same influences. In such districts Nature will gradually eliminate the worst kinds of yolk. In fact, the tendency is so strong that it has been found necessary in some localities to introduce heavy-yolked rams in order to counteract it. At the same time, sheep that exhibit, during a succession of dry seasons, next to no yolk, often show a great deal of it during good seasons; and, for this reason, any attempt to increase the yolk in the after generations by the use of heavy-yolked rams must, under most circumstances, be looked upon as a risky experiment.

In classing sheep for breeding purposes, I should certainly cull every heavy and sticky yolked sheep.

The factor next in importance to the yolk towards producing staples of the most desirable shape is the density of the growth of the wool fibres.

Density means the numerical proportion of wool fibres of the same diameter on a given surface of the skin. Theoretically speaking, density is the result of the diametrical areas of the fibres multiplied by the number of fibres, and the total area so obtained compared with the surface of, say, a square inch—an experiment of no practical value, as not available in practice.

Numerous investigations of that nature have been made, and instruments have been invented to test the degree of density. Here, however, the quantity of the yolk present generally interferes with a correct estimate of the real quantity of wool fibres that is present in the bulk of the wool to be tested. For all practical purposes, the real density of a fleece can only be tested on the sheep's back. Shorn fleeces do not always exhibit the characteristics of a dense growth clearly enough. It does not matter very much to the manufacturer whether the shorn fleece he has before him was of a dense growth on the sheep's back, so long as it is good in other respects. At the same time, densely grown fleeces recommend themselves to the buyer, because he knows that densely grown, shafty wools possess several other valuable qualities. A densely grown fleece, all other qualities being equal, will be preferred by the manufacturer to the open one. The density of growth may be tested in different ways:—1. By the external appearance of the fleece, whether the same is well closed, or whether there is any parting on the back, the neck, &c. 2. By compressing a few staples in order to find whether they are substantial or hollow, taking in the meantime the quantity of grease into due consideration. 3. By parting the wool right down to the skin, and looking at the space of the skin between the parted staples. If the wool is grown densely, the skin will have the appearance of a small line in zig-zag form; otherwise, if the wool is grown loosely it will appear like a broad line or a bare patch. Real density cannot be increased through feeding, although a fleece may be rendered denser in appearance through the quantity of the yolk being increased. I have mentioned already

that, according to Cuvier and Bischoff, all hair roots intended by Nature for the production of wool are fully developed before an animal is born, and the number of hair roots cannot be increased after that time. We may say that the seeds for the future growth of wool are sown into the woolfields by Dame Nature herself. The numerical proportion of the hair roots or the density of a fleece is a matter of individuality. The production of an exceedingly dense fleece may be looked upon as one of the greatest achievements in breeding. In forming stud flocks, as well as in sheep-classing generally, density should be considered as the main factor in producing heavy fleeces; it should be cultivated from the very first along with the length of the staple, and not be left to be attended to at some later, more convenient time. If openness is allowed to get hold of a flock at the first, it is very difficult to get rid of later on.

THE SHAPE OF THE STAPLES.

The ideal wool-staple is a perfectly round shaft that grows perpendicularly —*i.e.*, at right angles on the skin.

These shafts may be of different diameter. They may be large or small, and each of them may show the inclination to split up into finer ones; yet all of them must be round.

Such a perfectly cylindrical, perpendicular staple can only be formed from fibres which are of the same diameter right through, from the bottom to the top of the staple, and each of the fibres of which the staple is composed is in itself an even rod, with a circular, not elliptical, diameter in all its parts; otherwise the fibres could not place themselves so parallel to each other as to form one solid rod or shaft—*i.e.*, they must be perfectly true and round. The waves must not exceed the half-circle, otherwise they could not interloop with each other on all sides and in all directions. The fact that the waves are so equal that such an interlooping and at the same time a parallel growth of all the fibres are possible is a proof that all the fibres are of the same fineness, and that they are true.

The formation of a cylindrical and perpendicular staple is thus possible only if the wave is semi-circular or less so.

Now, it may occur that, whilst the fibres are true, the waves are more than semi-circular. In that case they cannot fit themselves so nicely into each other as the semi-circular and flatter waves. The staple now assumes a more elliptical diameter, and looks more like tape or ribbon than a rod.

This flat staple of elliptical diameter, though not much objected to by the manufacturer of the present day, is very objectionable to the breeder, because: First, these flat elliptical staples show want of density; second, they prove that there is a tendency in the skin of the sheep in question towards producing wool with too high a wave. Openness and a high wave occur together.

If perfectly true, cylindrical, and otherwise normally constituted wool fibres do not grow densely together, they cannot form a perpendicular shaft, but a pendulous one. Such staples form a regular parting on the back, and assume a ropy appearance on the other parts of the body. I have seen lots of such sheep at the Skipton show in Victoria.

Other staples show a regular twist. They are found at the lower part of the shoulder, and must be looked upon as an indication that there is a tendency to openness right through the fleece.

If the fleece is grown loosely, the staples on the lower thigh assume the shape of roof tiles or shingles. If the fleece is, on the contrary, of dense growth right through, the staples on this part of the body offer sufficient resistance to the presence of the body, when at rest, on these staples; and they do not assume the form of tiles or shingles, but retain a more shafty appearance.

Some staples terminate in a kind of spearhead; others in a bristle, which is formed by coarse hairs that are stuck together by the yolk. Others form broad, blocky masses in which the single staples can hardly be distinguished;

others, again, no longer deserve the name of staple in the sense in which it is used here, and the fleece has the appearance of a disorderly mass like a sheet of cotton wadding.

The most desirable staple is that solid, blocky, perpendicular bundle of fibres, which will easily subdivide into smaller and smaller divisions of equally solid and perpendicular staples. To obtain these we must have equally fine, perfectly true, and regularly waved fibres, differing as little as possible from the half-circular wave; these must grow very densely, and each of them must possess that tenacious strength which will enable them to persevere in a vigorous, perpendicular growth on the skin. Any deviation from this ideal cylindrical shaft is objectionable.

USEFUL ANIMALS.

MR. C. L. DU BOIS, in a paper read at a meeting of a branch of the South Australian Bureau of Agriculture on "The Most Useful Animal on the Farm," gives the premier position to poultry. He says:—Taking a dozen Minorca hens and one rooster, costing £2, with interest at 10 per cent., and depreciation at 25 per cent., 14s., and food at £2 16s. 4d., the year's cost would be £3 10s. 4d. If properly cared for, the hens should lay a minimum of 180 eggs each—they usually lay 200—mostly in winter, when they sell at 10d. per dozen. This would give 180 dozen at 10d.—£7 10s., less keep, &c., as above, £3 10s., giving a profit of £4, or 6s. 8d. on each hen. Compared with this, the ewe sheep does not give nearly so much profit on capital and cost. There is still more profit if the eggs are turned into chickens. He then produced a lot of figures and statistics concerning the imports into Britain of eggs and poultry from foreign countries. Last year, from six countries alone, there were 1,680,000,000 of eggs and £640,000 worth of poultry imported there. Eggs are used by millions in the arts, sciences, and manufactures, winemakers, photographers, calico-printers, glove-makers, leather-dressers, and many others. Mr. F. J. Brooks read a paper on the same subject, giving pigs the first place for profit if well cared for; but if ill-bred, ill-fed, and badly housed they are anything but profitable. He preferred the Berkshire, or Berks crossed with Poland-China or White Essex. These grow very rapidly for the first six months, especially if they get plenty of milk. At six months the porkers should weigh not less than 100 lb. He calculated the cost of feed for six pigs for the first six months after birth at £3 5s. 2d.—not allowing anything for milk, slops, &c. The value of the 600 lb. pork, at 4d. per lb., would be £10, giving a profit of £6 14s. 2d. In discussing these papers, most of the members were agreed that the fowl is the more profitable on the farm. They did not think the pig is profitable if it has to be shut up, and they are generally a nuisance if left to run about.

Dairying.

RELIEVING A CHOKING COW.

A CORRESPONDENT of *Farm and Home* writes to that journal:—Having saved the lives of several cows from being nearly choked by potatoes, I send my remedy to you for the benefit of your readers. All that is required is a piece of ¾-inch rubber hose about 4 feet long, costing say 7d. per foot. When a cow gets a potato or slice of a mangold stuck in her throat, run one end of the rubber hose down her throat. No injury will be done, and the obstruction will be easily forced down. There will be no need to put anything into the cow's mouth to keep it open, nor is there any trouble in getting the hose down her throat. Every dairy farmer ought to keep a piece of rubber hose in a handy place.

SLOW OR QUICK MILKING.

The *Danish Milk Times* has the following:—The question has been asked, "Ought milking to be done in a quick or slow tempo?" To answer this a series of trials have taken place in Germany, one of which we herewith publish. On the farm where the trials took place were the same lot of cows—five in number—alternately milked by an elderly woman, who milked very slowly, and by a very able young milkmaid, who finished her work in a very much shorter length of time. The following figures give the milk-yield from the same number of cows, milked at the same time of day, in pounds:—

No.	Slow Milking.	Quick Milking.
1	32	38½
2	34½	51½
3	50	68½
4	40½	43
5	44½	50

As an explanation of this enormous difference it is said that by the quick milking the milk-glands were influenced so as to give a larger quantity of milk.

WARTS ON TEATS.

What would appear to be a most important discovery in the treatment of dairy cows has been made by Mr. R. Gibson, of Limerick. He states that the outward application of castor oil to the udder, combined with good feeding, will convert an indifferent cow into a highly profitable one. In a letter to *Dairy*, he states that he purchased a Jersey cow with a blind teat, and the udder was covered with warts. By the outward application of castor oil he had the milk coming from the blind teat in two months, and every wart was gone. It is not possible that any application to the outside of a cow's udder will convert a poor milker into a good one; but if castor oil will remove warts from the udder of a milker, it is worth knowing, as the remedy is cheap, easy of application, and cannot do any harm.—*Pastoralists' Review.*

AN EXPERIMENT WITH CHEESE.

In the course of a conference of South Island (New Zealand) butter and cheese makers held in connection with the sixth annual winter show of the Otago Agricultural and Pastoral Society in Dunedin during the third week in June last, Mr. Ruddick, Instructor in Dairying, gave the results of an experiment he had conducted with cheese out of selected and ordinary milk. The cheeses were exhibited in the room, and his assistant, Mr. James Sawers, described their manufacture thus:—

The cheeses were manufactured at the Wyndham Factory on the 5th April. I had received instructions a fortnight before to inspect the dairies in the Wyndham district, and to see if the condition of the milk delivered at the factory would not be benefited, making a report to that effect. After the dairies were inspected, I went to the factory and inspected the milk as it came in, and I then concluded that the best way to report would be to manufacture some cheese, and let you see what the conditions were which then existed. I may say that the night previous to the day on which the cheeses were made was very warm, so that only the milk of suppliers who were attending to their milk, by cooling it, &c., was delivered in a sound condition.

No. 1 cheese was made from milk coming from dairies which I considered were paying most attention to the aerating and cooling of the milk. When run into the vat in the morning, the milk was found to be sweet. One per cent. of

pasteurised starter was added, and the rennet was added at a temperature of 86 degrees. From the time the rennet was added till the whey was off and the curd dry on the racks was 3 hours. This, we considered, was a very good time to get the best results. From the time the curd was dry on the racks till it was fit for milling was 2 hours and 5 minutes, and the time between milling and salting was about 5 minutes, and 10 minutes afterwards it was hooped.

No. 2 cheese was made from the ordinary milk delivered at the factory. We found that when the milk was delivered it was sufficiently advanced, so no starter was added, and the rennet was immediately added. Three-quarters of an ounce of colouring to 1,000 lb. of milk was added. This was also set at a condition that gave us 3 hours from the time the rennet was added till the curd was dry on the racks. We found the flavour was a little defective, while the curd was a little acid. It was fit for milling in 1 hour and 40 minutes from the time it was dry to cutting, and sufficient time to aerate and get the flavour as good as possible before salting. Three per cent. of salt was added.

No. 3.—This cheese was made from milk in a very advanced stage—a class of milk we often find during the summer in a great many factories throughout the whole colony. We found this vat was very fast. We put in a little more than the 3 oz. of rennet in order to get the coagulation sufficiently firm to be able to cut it as soon as possible. From the time the rennet was added to this vat until the whey was off was 1 hour and 10 minutes. Any cheesemaker will understand from that what sort of milk we had to contend against, and I may also remark that this cheese, in my opinion, had a little more acid than I would like to see. The manufacture was exactly the same after the whey came off as with the others. Three per cent. of salt was added—the same as the other two.

I have tested the cheese myself at the factory on one or two occasions to see how they were progressing. I then received instructions from Mr. Ruddick to fetch them here, in order to see what exporters would think of them, and I have, therefore, much pleasure in asking Mr. MacEwan to give his opinion on them.

Mr. MacEwan (having tried the cheese) said: After the explanation made by Mr. Sawers, I would say that the experiment demonstrates, from a standpoint of manufacture, one of the strongest points made by dairy-instructors since the factory system was started in New Zealand—that, even where you have bad milk, you can, with skilful management, nearly always make a very fine "trying" cheese. To make the point clear: We sometimes find that a cheese cuts very close and has a fine texture. Other cheese we find open in the body, sometimes showing pin-holes, and sometimes porous—defects directly the fault of the manager. We find here that, although we have three different lots of milk, the cheeses, from a point of manufacture, are all well made; showing that, even when you have faulty milk, you can always, with care and intelligence, get a passable cheese. Then we have flavour; and this is a point very difficult for the manager to overcome, caused by the fault or carelessness of suppliers. Take the No. 1 cheese: Although it is a little cold, and it has consequently taken some time to get the curd warmed up, still the flavour is almost quite clean, giving what is very strongly called for in all parts of the world—a mild, clean-flavoured cheese. No. 2 is not quite so nice; but No. 3 has a condition which I would say, with the very limited time we have for examining them, would not stand anything like age before it would show a bad fault. I think this is all I am called upon to say, but I would like to emphasise the position taken up by instructors and the Department of Agriculture as far as our cheesemakers are concerned. We say you have a certain responsibility, and, if you employ skill, you can always make a passable cheese out of any milk you handle—a cheese fairly close in the body, and which, although not always choice, would always pass in the market. Then, given the most skilful management we have got—for the manager must do a reasonable share of the work—we have it here demonstrated beyond a doubt that, if we have care of the milk, aeration or cooling, we have managers in New

Zealand who can make the very finest cheese we can require. I might also touch upon another point—a point mentioned this morning—that of starters. I am a thorough believer in this, and if our manufacturers will provide clean-flavoured starters—it is only a detail how they are prepared, as long as we get them clean-flavoured—we can always ensure a cleaner-flavoured and a more "nutty"-flavoured cheese. Object-lessons such as we have had to-day are always beneficial, and no doubt when the meeting is over to-day managers will have an opportunity of boring these cheeses and examining for themselves. You will find that they are all well made from a manufacturer's standpoint, but that the condition of the milk rendered it almost impossible to get the mild-flavoured cheese so much desired.

AN EXPERIMENT WITH BUTTER.

At the New Zealand Conference mentioned above, Mr. Ruddick referred to an experiment which had been conducted by the Taieri and Peninsula Milk Supply Company of Dunedin.

In reference to this he said: The Taieri and Peninsula Milk Supply Company made some butter at their factory here on the 22nd April, 1898. This butter, I believe, took first prize at the last winter show. It was then placed in their refrigerating chamber, and kept at a temperature of 20 degrees of frost. It was taken out in the third week in June, and kept in their making-room till show day, when it was brought to the show and examined. I had the privilege of looking at the butter last night, and was very much surprised to find it had kept so well. To come to the point, I may say that one box was scored at 89 points, and the other at 92—most remarkable scoring for butter now 14 months old. There is a difference in the two packages. One was made from ripened cream, and the other from unripened. The ripened cream has kept the better, and is best to-day. That made from the sweet cream is rather dead in flavour—in fact, not having much flavour at all, though neither of the boxes is particularly strong. I do not think that I am out of the way in saying that we find fresh butter going through the grading stores with a poorer flavour than these butters. Mr. Gilruth has pointed out that under certain conditions butter will not keep, even in cold storage, when the water is not pure. This butter, which, no doubt, was of very excellent quality to have taken first prize, would keep because it was free from impurities. It emphasises the importance of having the best of water, and is also another argument in favour of employing low temperatures in handling the butter. It is a point, too, in favour of ripened cream, and it should point out to butter-makers that they require to give that part of their work all the attention they can, as the ripening of the cream is a most important point.

PAINLESS DEHORNING.

In using caustic potash to dehorn calves, unless great care be used there is danger of injuring the animal's eyes. To avoid this a farmer of experience succeeded in finding a substance which would give consistency to a solution of potash and yet not reduce its strength. The substance was black oxide of manganese.

In preparing the mixture, fill a phial about half full of the oxide; then finish filling with a saturated solution of the caustic potash.

In applying, cut away with a pair of shears all the hair from the embryo horn, making a clear space of about the size of a sixpence. Then with an indiarubber stopper, the end of which is cut in diamonds, similar to the old-fashioned letter stamp, rub the mixture in until an appearance of redness is

produced, and the results will be satisfactory. The calf should not be more than three weeks old, and the earlier the better. As the ingredients separate, the bottle should be well shaken for each application. If a rubber bottle-stopper is not at hand, a very good substitute can be made from a common rubber pencil-eraser.

PIGS AND THEIR MANAGEMENT.

No. 2.

KEEP WELL-BRED PIGS.

SUCH is the advice of the *Farmer and Stockbreeder*. There are hundreds of farmers who are sceptical of the merits of pure-bred swine. With them a pig is a pig, and they insist that, with plenty of food and under like conditions, one will gain as much weight as the other and make as much profit. A careful trial will prove the contrary. Anyone breeding an inferior sow to a pure-bred boar will readily see that pigs from such sows are far more attractive, and will fatten more readily, and even the first cross will mature earlier, than mongrel-bred. A well-bred pig will make more meat in less time, and therefore with less feed. However, the farmer who breeds the improved pig on both sides with the expectation that he will make a profit out of his pigs without attention will be disappointed, for good care and attention are essential to success. With good feed and treatment the well-bred can be made fit for market in from six to eight months, while the scrubbers will require from 15 to 18 months to make the same weight.

The good-natured pigs are the most profitable to feed. A pen full of quarrelsome animals will not lay on fat so fast as those which go in for eating instead of fighting, and keep happy and good-natured. Select the young pigs at feeding time, and pick out the good-natured ones, and keep these for your own use.

In order to meet with success, the right start must be made. This can be done by selecting the right kind of breeding stock. The male, invariably, should be a pure-bred. He should, in addition, possess individual merit, with vigour enough to transmit his good qualities to his offspring. To increase this value in the offspring, sows of the same breed as the male, which have been carefully selected, should be used. Yet there can be a good cross of pigs reared if a pure-blood boar is used on a well-selected lot of well-matured sows. Immature breeding lessens the vitality, and if kept up is certain to show the effect in weak and puny pigs.

WHAT THE PERFECT PIG IS LIKE.

The outline of a perfect pig, when viewed from any direction, should be nearly that of a parallelogram, with the corners slightly rounded. His back and belly, also his sides, should be straight and parallel; and, when viewed from front or rear, his outline should be nearly square, but a little deeper than wide. The head should be short; the face straight or somewhat dished and wide between the eyes; the ears should not be too large, should be thin, soft, and joined to the head by a small knuck. A large, coarse ear usually indicates a coarse animal, which will fatten slowly. The jowl should be full, well rounded at the sides, and making a straight line from the tip of the lower jaw to the point of the breastbone. The neck should be short (the shorter the better), but well rounded, arched, and increasing in size from the head to the shoulders. The shoulders should be full and square, with the legs set well apart, so as to afford ample room for the lungs and heart, and the heart girth just behind the shoulders should be nearly equal to the girth at any other point. The back should be broad and straight, and should be slightly arched, rather than swayed between the shoulders and hams The ribs should be well sprung to make the back broad, and should drop nearly straight at the sides. The belly should be wide and straight, not flabby nor drawn in at the flanks. The hams should be

as wide as the shoulders, nearly flat across the top, and drooping but little to the root of the tail; they should be well rounded behind, and come well down on the stifle, so as to make the lower part of the ham full and plump. The legs should be short, straight, set well apart, and strong enough so that the animal, even when well grown, will walk wholly on his feet and not upon his hocks and dew-claws. The bristles should be fine, soft, and sufficiently thick to hide the skin. Coarse, stiff, erect bristles indicate a coarse animal, which will mature late and unsatisfactorily, while if they are so few and short as to show the skin plainly they indicate a weak constitution and consequent liability to disease.

FORM OF THE BOAR.

The form which the boar should have will, of course, be modified by the breed, but there are certain essentials of form which all boars should have, whatever the breed. They should be of strong build, and yet without coarseness. The neck and body should be short for the breed, and the limbs inclining to short rather than long. These qualities are desirable for the reasons: First, that they are associated with bodily vigour; and, second, that they indicate easy feeding. Compactness of form, or an approach to it, is always more important in the boar than in the sow. In the very long-bodied breeds it is very important, indeed, that close attention be given to choosing males from those types not unduly long in body. Good strong shoulders, much width of chest, good strong backs, deep sides, and large quarters are all important, and good heart and flank girth are doubly important; nor should good width and chest girth be overlooked, as it is so intimately associated with constitution. And symmetry in a boar is important. Symmetry means a happy relation of all the different parts to one another. It is the opposite of undue development of one part of the body, followed by lack of development in some other part. A boar with uncommon development of the shoulder and weak loin is decidedly inferior to one possessed of good medium development of shoulder and good medium development of loin, and so of all the other parts in their relation to one another.

SOME ESSENTIALS TO PIG-REARING.

One of the essential features in the successful rearing of pigs is to select some good breed and stick to it, breeding so as to improve all the time.

Another thing necessary is a good pasture for the pigs to run on, as they will get half their living there. They should not be turned on the pasture until after it has got a good start. The pigs should be fed well and at regular intervals. Brood sows should be selected which have long, deep bodies, and an inferior boar should never be mated with them. Use only a pure-bred boar, of first-class quality. If this rule is followed, you will have a good lot of pigs both in quality and numbers.

MANAGEMENT OF BOAR.

Assuming that the boar is of suitable age, healthy, and the sows are at service when he is tried with them, he must have some physiological defect in the genital organs if he repeatedly refuses to notice such sows. Such a defect may not be perceptible during life except by results; therefore it is quite easy for such an animal to be pronounced all right after an ordinary examination, even by an expert, unless he possessed some knowledge of his previous conduct. It is doubtful whether any treatment will alter this state of things, as in these cases Nature invariably asserts herself, unless there is some good reason for her not doing so, sooner or later, if it be only a temporary disablement. You may change the diet somewhat, using a little stimulating food such as barley-meal, if the boar be not already too fat, and you have not already tried this. Powdered cardamom seeds in ten-grain doses may be given him night and morning in his food for a few days. With the boar, slop or light feed, especially of a character that has a tendency to fatten rather than to form bone and muscle, should be avoided.

BUSINESS MANAGEMENT OF PIGS.

An Illinois (U.S.A.) farmer says:—The pig is an automatic combined machine for reducing the bulk in grain and enchancing its value; a machine that oils itself; a condenser, a manufacturer of ham, bacon, lard, illuminating oils, hair brushes, tooth brushes, head cheese, glue, buttons, fertilisers, soaps, souse, sausage, and satisfaction. The work of improvement in live stock is never done. Do not attach undue importance to popular strains that may be the passing fashion on fancy points, colour of hair, &c., provided you do not get outside the colour of the breed. Emphasise especially the vigour of constitution, capacity for digestion, &c. Some close observers believe the process of refining in breeds has reached the danger line in lightening the framework. Sturdy, straight limbs and strong, upright feet must be had to enable a pig to stand squarely and steadily. Avoid long, slender, pipestem style of legs, ending in slim, uncertain ankles and weak feet, together with a failure to carry the meat of the ham full and well down towards the hock. Good pigs are not accidentally secured. Select your breeding animals early, and get them in proper condition for breeding. Large litters of healthy pigs come from healthy parents liberally fed for forming bone and muscle. Observe as vital points the strong arched back, the well-sprung ribs, the full heart girth, the broad shoulders and deep ham, the strong underpinning, the strong shapely foot. More depends on your care of your breeding stock than many suppose. No rule can be laid down as to the amount of feed that should be given daily to the boar, the brood sow, or the growing pigs.

RUNNING BOARS WITH SOWS.

A practice that has a tendency to depreciate the standard of excellence is to allow boars liberty to serve sows *ad libitum*, and to be turned out with the herd or confined with a number of sows in a yard. Is excessive service less harmful to future offspring of swine than of other live stock? One service, as a rule, will give satisfactory results as to the number of vigorous pigs, while, when the other system is followed, small litters, dead pigs, deformed pigs are the result, but in pig-breeding this is ascribed to bad luck, while the horse-breeder would charge it to excessive use of the sire. Build a paddock or yard 4 or 5 rods square, with a shanty-like house 7 feet by 8 feet, 7 feet high in front, 5 feet to rear, with a door 2½ feet by 4 feet high to permit of entrance when cleaning it, a half drop or swing door on hinges, attached to the upper part, to keep out beating storms and cold, and a tight board fence, high and strong, which will prevent teasing the sows, and will also prevent fretting and irritating the boar. This often has disastrous results, the boar becoming impotent by self-abuse, especially in the case of young sires.

EARLY MATURITY.

One of the characteristics or conditions of life of our improved breeds which has been brought about by artificial selection and artificial life is that of early maturity—that is, cattle, sheep, and pigs attain their full size and development and give full return at an earlier age than in former years. This tendency has affected even the teeth, and we have these developing in considerably shorter times, and thus at earlier ages than was wont, and consequently the system of judging the age of these animals by their teeth has had to be modified correspondingly with recent years. The daily increase in live weight of a fattening ox, sheep, or pig is largest in the earlier stages of its existence—that is, the same amount of food will increase its weight more quickly when young than when nearing full growth.

SELECTION OF BREEDING SOWS.

Mr. John Craig, an English pig-breeder, writes as follows on this subject:—In such work as I have had to do in pig-breeding I have found some features having a strong tendency to be transmitted; and as these are practical points, I

think they ought to take precedence over everything else. In breeding sows blind teats are not infrequent, and I have noticed that these are one of the things that are very often transmitted. In choosing a sow, see that she has twelve fully developed teats, six on a side, and that they run far forward. The words "fully developed" are used advisedly, for if they do not stand out from the body, and also appear full, they are invariably blind, and in many cases they will remain so throughout her career. Again, sows are very often deaf, and in many cases where the young pigs are killed by the sow lying on them it is very often because the sow has been deaf and unable to hear the cries of her young. That this is transmitted I know to be a fact from personal observation. That very important quality, prolificacy, in a brood sow is transmitted very strikingly. Some breeders keep this quality in mind, and select their brooded stock with this as the most desirable characteristic to secure. Where it is neglected, it will be found that the litters as a rule are small in number. With this characteristic the milking qualities are usually associated. They seem to depend upon each other to a degree for their proper development. There is as great a variation in the milking qualities of sows as in any other characteristics, and it is a point of very great importance, for on it depends the early thrift and growth of the young pigs.

SELECTING THE BROOD SOW.

J. M. Jamieson, in *American Swineherd*, says:—A sow should have good length, with a strong broad back, slightly arched, strong across the loins. Particularly do we want a sow broad across the hams, as observed when standing behind her, and the hams should extend well down on the hocks. She should also have great depth of body, but not the narrow depth that allows the belly to drag the ground when she is heavy with pig.

Always select a sow that shows a quiet disposition. Indications that point to this are a broad face and ears that are not foxy. With the up-eared breeds a dividing line is easily drawn between those that are quiet and those that are too nervous.

Particular care should be taken to select those that have good strong bone, and stand perfectly on their feet. Attention should also be given to the number of teats. There should be more than ten. We have two aged sows that only have ten each, and we have several times wished they had more. With all these desirable points, the sow should also have a good coat of hair.

Now, as to feeding from birth to farrowing time, it should be along the same line all the time. The foods that are best to produce bone and muscle are also the ones to produce the most desirable development of the young she carries, and the milking qualities.

Sows for breeders should have plenty of range over pasture fields. Exercise is absolutely necessary for proper development of the system. Aside from the pasture she gets, she should have bran and middlings with a very small amount of corn. With all this care in selection she must also have kind treatment, so that she will always look on her keeper as her friend. Many coarse qualities that are desirable in a good brood sow will condemn her in the show ring, and her offspring for feeders. But these can be eliminated from her offspring by the selection of their sire.

AT WHAT AGE A SOW SHOULD BE BRED.

Opinions differ on this subject, but, to produce the best results, a sow, in our opinion, should be at least twelve months old—some say fourteen months—before she is bred. By the time she will farrow her first litter she will have attained good size, and therefore be better prepared to stand the drain upon her which will be required of her to raise her litter in good shape. Besides this, she will likely make a larger sow than she would have done if she had been bred earlier in life. She will also give her litter a better start in life than a younger sow would do; in fact, she should do as well as an aged sow.

Most breeders think that they cannot wait this long on sows before they breed them, yet if a breeder has a choice young sow, and wishes to make something first-class out of her, he can well afford to wait the extra six months before he breeds her.

A sow should never be bred before she is eight months old, and she should then have the very best of care until her litter is weaned; then she should not be bred to farrow her second litter before she is 23 or 24 months old, for she needs at least seven or eight months' time to finish her growth before she farrows her second litter, for if she is a good suckler she will make little if any growth while she is suckling her first litter. She must, therefore, have time to finish her growth before she farrows her second litter, or she will be always undersized. It takes plenty of size combined with style and finish to make a choice brood sow; and if we would have a little more patience and let our sows more fully mature before they have their first litters, it would be easier to have large, well-finished brood sows in our herds.

SIZE AND MEASUREMENT OF BREEDING PIGS.

P. C. Holme, in *American Swinebreeder*, says:—It is a common fault of farmers, and of many breeders, to place too high an estimate on size, losing sight of general excellence and lines of breeding. Growthiness of itself is a desirable trait of any feeding animal, provided that with it are carried good proportions, squareness of build, and evenness of flesh. It is true that in a herd of cattle or litter of pigs the biggest is often of the least value for the feeder, the butcher, or the breeder. So in selecting an animal for breeding purposes one must not overestimate size. Bigness is generally coupled with unevenness and lack of symmetry. And as symmetry covers all the points, and means that they are developed uniformly or in such harmony as not to leave the animal very defective at any one point, we must place a higher value on symmetry than on bigness alone.

It is no uncommon thing to hear farmers say, after looking at an animal that has won many prizes in the show ring and on the track, that they have better animals at home. Of course we all doubt their assertion and pity their lack of discrimination or want of knowledge of what goes to make an animal of high excellence all round. No intelligent breeder is willing to use a male that is very deficient in girth, loin, limb, or quarter. He may use one that is not as fancy in the ear, or head, or colour as he would like, yet these are minor points compared with those which go to make form and weight, quality and constitution.

Again, we have seen men testing the value of animals wholly by measurements. While this may help the beginners, yet the experienced breeder and handler will see in the animal defects or excellencies which the tape line and rule cannot show. There are outstanding excellencies of style, finish, symmetry, and quality that measurements fail to reveal or balance, so as to show their value as a whole. If the experienced breeder meets a pig or calf that combines the quality, symmetry, growth, and stamina that attract him, he will next want to know the breeding. This test fixes the price of such an ideal pig or calf above that of the butcher so far that farmers and others wonder what the buyer could see in that animal to make it worth the price paid. The art of breeding has made such an advance that blood has a value not to be estimated by pounds avoirdupois, but by pounds sterling.

Until a higher value is placed on general excellence, coupled with good breeding, and less value on mere bigness or special fads for big measurements or fancy ears and tails and markings (all desirable, but of no fixed value until they are so combined with good breeding, and individuality shown in symmetry, quality, and finish), we will not see farmers making the improvement in their stock that is easily possible, with better ideas of what is needed in a breeding animal. So long as we have so many breeds of varying types and breeders of unlike tastes and ideals, we may not hope for a perfect description of a perfect

pig. But we must all agree on the necessity of good blood as well as of good size and proportion. These we may call essentials. So long as vigour and stamina and feeding qualities are prime requisites in the profitable boar or sow, and as Nature has coupled these with the strong back and loin, and these short rather than long, the great hearth girth and deep side, we cannot expect to find the ideal pig in the one of greatest length. A long back is a weak back, a long leg tells of restless temperament, and these, with a long neck, slim waist, and narrow between the eyes, all point to lack of feeding quality. One cross from an animal with any of these measurements is enough to give a young man a life-time job to correct or eliminate from his herd. A strong shoulder is a good thing, but one abnormally large, and coupled with a slim waist or cut-up flank and narrow loin and ham, is a greyhound combination that has no place in a feed lot. Symmetry does not allow any abnormal development of any part of the animal.

PREVENTION OF SWINE FEVER.

DR. SALMON, of the United States Bureau of Animal Industry, as a result of extensive experiments, recommends the following mixture as a useful preventive and probable cure of swine fever:—1 lb. wood charcoal, 1 lb. sulphur, 2 lb. sodium chloride, 2 lb. sodium bicarbonate, 2 lb. sodium hyposulphite, 1 lb. sodium sulphate, and 1 lb. antimony sulphide. A dose of these ingredients, which should be thoroughly mixed, is one large tablespoonful per 200 lb. live weight in a pig once a day. Dr. Salmon explains that it may be given in soft food if the pig is not too ill to eat, or otherwise as a drench.

THE DAIRY HERD.

QUEENSLAND AGRICULTURAL COLLEGE.

RETURNS FROM 1ST TO 30TH NOVEMBER, 1899.

Name of Cow.	Breed.	Date of Calving.	Yield.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.			
Annie Laurie*	Ayrshire	12 June, 1899	664	3·2	23·79	
Blink ...	,, ...	23 April ,,	368	3·6	14·82	
Isabelle ...	,, ...	2 June ,,	489	3·3	17·9	
Lena ...	,, ...	17 June ,,	671	3·7	27·8	
Linnet ...	,, ...	19 June ,,	710	3·1	24·64	
Rosebud ...	,, ...	12 April ,,	510	3·6	20·56	
Ream ...	,, ...	13 Aug. ,,	546	3·6	21·00	
Leesome ...	,, ...	12 Oct. ,,	881	3·3	32·55	
Ream Routhie*	,, ...	19 Sept. ,,	647	3·4	24·6	
Content ...	,, ...	11 June ,,	552	3·9	24·1	
Eileen* ...	,, ...	13 Aug. ,,	641	4·4	31·58	
Jersey Belle	,, ...	4 July ,,	563	3·9	24·58	
Stumpy* ...	,, ...	1 July ,,	677	4·6	34·87	
Playful ...	,, ...	6 Aug. ,,	464	4·3	22·34	
Ivy ...	,, ...	2 Oct. ,,	431	3·5	16·45	With first calf
Beatrice ...	,, ...	19 Oct. ,,	462	3·8	19·65	,,
Bashful ...	,, ...	16 Nov. ,,	164	3·6	6·6	,,
Connie ...	,, ...	29 Sept. ,,	419	3·8	17·83	
Fancy ...	South Coast ...	7 May ,,	370	4·0	16·5	
Scarlet ...	,, ...	13 Oct. ,,	676	3·5	26·5	
Misery ...	,, ...	4 May ,,	471	3·0	15·82	
Toughy* ...	,, ...	11 Sept. ,,	671	3·1	23·3	
Banjo ...	Devon	5 Oct. ,,	443	3·8	18·4	
Broad ...	,, ...	5 Oct. ,,	511	4·2	24·03	
Rosie ...	,, ...	11 Oct. ,,	589	4·0	26·38	
Monday ...	,, ...	24 Oct. ,,	553	3·6	22·06	
Patience ...	,, ...	5 Oct. ,,	443	3·7	18·3	

THE DAIRY HERD—*continued.*

RETURNS FROM 1ST TO 30TH NOVEMBER, 1899—*continued.*

Name of Cow.	Breed.	Date of Calving.	Yield.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.			
Gertie ...	Shorthorn ...	3 June, 1899	482	4·0	21·59	With first calf
Spot ...	,, ...	17 Oct. ,,	560	3·6	22·5	,,
May ...	,, ...	26 May ,,	19	4·1	·87	Dry, 3-11-99
Nestor ...	,, ...	27 Feb. ,,	233	3·9	9·3	With first calf
Plover ...	,, ...	25 April ,,	447	3·6	18·02	,,
Queenie ...	,, ...	20 April ,,	389	3·9	17·2	,,
Painter ...	,, ...	4 Sept. ,,	754	3·6	30·39	,,
Brush ...	,, ...	12 Sept. ,,	712	3·9	29·5	,,
Blossom ...	,, ...	14 Sept. ,,	612	3·4	23·3	,,
Florrie ...	,, ...	15 Sept. ,,	589	3·6	23·52	,,
Kit ...	,, ...	16 Sept. ,,	642	3·6	25·9	,,
Frizzy ...	,, ...	27 Sept. ,,	614	3·5	24·0	,,
Kate ...	,, ...	30 Aug. ,,	498	3·7	20·63	,,
Violet ...	,, ...	1 Oct. ,,	583	3·8	24·8	,,
Laurel ...	Grade	4 Oct. ,,	812	3·6	32·73	
Restless ...	,, ...	4 Oct. ,,	732	3·3	27·0	
Rosella ...	,, ...	9 Oct. ,,	797	3·5	31·23	
Redmond ...	,, ...	6 Oct. ,,	773	3·6	28·58	
Jane ...	,, ...	11 Oct. ,,	578	3·8	24·59	
Shelly ...	,, ...	13 Oct. ,,	581	3·7	24·07	
Peggy ...	,, ...	14 July ,,	482	3·8	20·5	
Stranger ...	,, ...	15 Aug. ,,	675	3·8	28·72	
Empress ...	,, ...	23 Aug. ,,	639	3·6	25·76	
Mundah ...	,, ...	29 Sept. ,,	658	3·2	23·57	
Pokey ...	,, ...	26 Sept. ,,	521	3·4	19·83	
Sally ...	,, ...	23 Sept. ,,	691	2·9	22·43	
Rose ...	,, ...	11 Feb. ,,	453	3·4	17·24	
Whiteflank*	,, ...	4 June ,,	625	3·5	24·49	
Star ...	,, ...	17 Dec., 1898	638	3·9	26·74	
Roany ...	,, ...	12 June, 1899	512	3·4	19·48	
Ranger ...	,, ...	9 June ,,	502	3·7	20·79	
Ginger ...	,, ...	17 June ,,	465	3·5	18·22	
Biddy ...	,, ...	18 May ,,	614	3·9	33·53	
Bally ...	,, ...	12 Oct. ,,	732	3·8	31·14	
Beauty ...	,, ...	14 Oct. ,,	787	3·3	29·08	
Leopard ...	,, ...	17 Oct. ,,	643	3·8	20·16	
Trial ...	,, ...	26 Oct. ,,	791	3·6	31·88	
Duchess ...	,, ...	27 Oct. ,,	712	3·7	29·5	
Pet ...	,, ...	5 Oct. ,,	587	3·5	23·0	
Podge ...	,, ...	1 Nov. ,,	603	3·4	22·96	
Russet ...	,, ...	10 Nov. ,,	186	3·6	7·0	
Alice ...	,, ...	13 Nov. ,,	238	3·6	9·58	
Daisy ...	,, ...	21 Nov. ,,	169	3·8	7·19	

Cows marked * have been under test, and are referred to more specially in another report sent herewith.

The cows, with such exceptions, were grazed in the creek paddock during the daytime, and in the home paddock during the night.

The six cows with which these tests were carried out are the cows the test of which were given in last month's *Journal.*

They were allowed to feed on ordinary pasture for 10 days, commencing 6th November, 1899.

At the end of this period they were fed, twice a day, on a ration consisting of 10 lb. mixed chaff, 4 lb. bran, and 1 quart molasses (the molasses being diluted with 3 quarts of water) for each cow, this feeding being continued for 10 days.

As may be seen by the results given on next page, the percentage of butter fat and yield of milk remained practically the same, a result which may be attributed to a great extent to the fact that the natural pasture was very good at the time.

TEST OF SIX COWS FED ON ORDINARY PASTURE FOR TEN DAYS, COMMENCING 6TH NOVEMBER, 1899.

Name of Cow.	6 Nov.			7 Nov.			8 Nov.			9 Nov.			10 Nov.		
	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.
	lb.			lb.			lb.			lb.			lb.		
Annie Laurie ...	23	3·1	·80	25	3·2	·89	24	3·3	·88	23	3·1	·80	24	3·3	·88
Eileen	22	4·1	1·01	20	4·6	1·03	21	4·4	1·03	20	4·8	1·07	21	4·4	1·03
Ream Routhie ...	21	3·2	·75	19	3·3	·69	19	3·6	·76	19	3·5	·74	19	3·3	·69
Stumpy	22	4·3	1·06	25	4·6	1·28	22	5·0	1·23	23	4·8	1·23	24	4·7	1·25
Toughy	20	2·8	·62	20	3·0	·67	21	3·2	·75	22	3·1	·76	19	3·3	·69
Whiteflank	20	3·2	·71	19	3·5	·74	20	3·4	·76	20	3·6	·80	21	3·5	·81

Name of Cow.	11 Nov.			12 Nov.			13 Nov.			14 Nov.			15 Nov.		
	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.
	lb.			lb.			lb.			lb.			lb.		
Annie Laurie ...	21	3·2	·75	21	3·3	·77	21	3·3	·77	22	3·1	·76	23	3·1	·80
Eileen	20	4·5	1·0	20	4·6	1·03	17	4·6	·87	19	4·8	1·02	20	4·9	1·09
Ream Routhie ...	20	3·4	·76	19	3·5	·74	18	3·3	·66	21	3·4	·79	20	3·6	·80
Stumpy	23	4·9	1·25	21	4·9	1·14	19	4·8	1·02	21	4·9	1·14	22	4·8	1·17
Toughy	20	3·0	·67	20	3·1	·69	19	3·0	·64	21	3·2	·75	20	3·1	·69
Whiteflank	21	3·4	·79	20	3·6	·80	19	3·3	·69	20	3·4	·76	20	3·6	·80

TESTS OF COWS FED ON A RATION OF BRAN, MIXED CHAFF, AND MOLASSES FOR TEN DAYS, COMMENCING 16TH NOVEMBER, 1899.

Name of Cow.	16 Nov.			17 Nov.			18 Nov.			19 Nov.			20 Nov.		
	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.
	lb.			lb.			lb.			lb.			lb.		
Annie Laurie ...	21	3·3	·77	20	3·2	·71	19	3·3	·69	21	3·1	·72	22	3·2	·78
Eileen	20	4·6	1·03	21	4·4	1·03	19	4·9	1·04	19	4·9	1·04	20	4·5	1·0
Ream Routhie ...	20	3·4	·76	19	3·5	·74	18	3·7	·74	20	3·4	·76	19	3·2	·67
Stumpy	23	4·7	1·21	22	4·3	1·06	19	5·0	1·06	22	4·8	1·17	20	4·6	1·03
Toughy	20	3·0	·67	21	3·2	·75	20	3·3	·74	19	3·0	·64	20	3·1	·69
Whiteflank	21	3·6	·84	20	3·4	·76	21	3·5	·81	19	3·7	·78	19	3·5	·74

Name of Cow.	21 Nov.			22 Nov.			23 Nov.			24 Nov.			25 Nov.		
	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.
	lb.			lb.			lb.			lb.			lb.		
Annie Laurie ...	23	3·0	·77	23	3·1	·80	22	3·2	·78	21	3·3	·77	23	3·1	·80
Eileen	21	4·4	1·03	18	4·3	·86	20	4·7	1·05	19	4·9	1·04	19	4·6	·97
Ream Routhie ...	20	3·6	·80	18	3·4	·68	21	3·2	·75	18	3·6	·71	20	3·6	·80
Stumpy	21	4·7	1·10	20	4·8	1·07	23	4·8	1·23	24	4·7	1·25	25	4·9	1·36
Toughy	21	2·9	·67	21	3·2	·75	20	3·1	·69	21	3·0	·70	20	3·1	·69
Whiteflank	23	3·1	·80	21	3·3	·77	19	3·7	·78	22	3·4	·83	21	3·6	·84

TOTAL AMOUNT OF MILK AND BUTTER OBTAINED FROM 6TH TO 25TH NOVEMBER.

Name of Cow.	6th to 15th November.			16th to 25th November.		
	Milk.	Average Test.	Butter.	Milk.	Average Test.	Butter.
	lb.		lb.	lb.		lb.
Annie Laurie	227	3·2	8·13	215	3·2	7·6
Eileen	200	4·6	10·2	196	4·6	10·09
Ream Routhie	195	3·4	7·4	193	3·5	7·4
Stumpy	220	4·8	11·8	219	4·7	11·5
Toughy	202	3·1	7·0	203	3·1	7·0
Whiteflank	200	3·4	7·6	206	3·5	8·0

The Horse.

STABLE NOTES.

BY W. C. QUINNELL, M.R.C.V.S.

DISEASES OF HORSES.

GENERAL DISEASES.—FEVER.

Fever is the term given to abnormal condition of the system, characterised by undue elevation of temperature, accompanied by a quickened pulse and increased breathing. The temperature of the body represents the balance between the production and loss of heat, both of which factors are under the control of the nervous system, and are brought into relation with each other by the circulation of the blood.

In fever this balance is disturbed, and the temperature rises.

Varieties of Fevers.

Simple Fever, when it occurs in a mild or trifling form and caused by functional derangement of certain organs.

Inflammatory Fever, when it is associated with acute local inflammation arising from wounds and injuries.

Specific Fever, when it depends upon the introduction of a specific poison into the body; for example, *Influenza.*

Malignant Fever is very severe and of exceptionally fatal type; example, *Glanders.*

Simple Fever is a benign affection, and usually terminates in restoration to health, and is accompanied by serious complications.

Causes.—Exposure to cold and wet weather, chills due to variations in temperature, fatigue, irregular dieting, and want of good sanitary arrangements.

Symptoms.—In fever there are conditions besides the elevation of temperature, &c., which are as follow:—

(*a*) The *skin* is generally hot and dry. In some cases it is bathed in perspiration.

(*b*) *Restless and delirium* are common nervous symptoms.

(*c*) The *febrile* condition is frequently ushered in by a *chill* or *rigor*, due to excessive and spasmodic contraction of arteries that supply the skin. The skin is, therefore, either generally or in certain parts relatively or actually cold to the touch.

(*d*) *Digestive Disturbance* indicates itself by *dry* mouth, coated tongue, thirst, loss of appetite, and constipation.

(*e*) *Urine* will be noticed to be scanty, more highly coloured, and of higher specific gravity.

(*f*) *Emaciation* or falling off in condition generally follows, and takes place in proportion to the intensity and duration of the fever.

Treatment.—Remove animal to a cool, clean, and well-ventilated loose box. In the early stage the surface temperature should be kept up by friction and by moderate clothing. If the limbs are cold, have them well hand-rubbed, and apply flannel bandages. Much relief and comfort can be given to the patient by sponging the surface of the body, the swollen eyelids, nostrils, and mouth out

with cold water and vinegar now and again. In ordinary cases a little more is required than to give sloppy food and gruel to drink, in which half-an-ounce to an ounce of nitrate of potash may be dissolved, or it may be put into the drinking water. Green forage should be allowed, and warm mashes or an aperient powder ought to be given if constipation is present; and to ward off complications and prevent the animal from running down, stimulants such as whisky or beer may be given two or three times in the course of the day.

Strangles.

A specific eruptive fever peculiar to horses; frequently associated with catarrhal symptoms, chiefly attacking young animals. Those between two and six years old are specially predisposed to be attacked, and it seldom occurs more than once in the lifetime of the animal.

In normal cases abscesses develop in the connective tissue in the space between the branches of the lower jaw, and involve adjacent glands, while the infective organisms are liable to be carried to and inflame other glands in the shoulder, groin, or internal organs.

When the glands attacked are near the surface of the body, the matter formed in the abscess is enabled easily to gain an outlet (as abscesses always have a tendency to point to the part which offers the least amount of resistance), or need be by the assistance of the lancet; the system is thus freed of the purulent and infective matter.

But if internal glands or organs are attacked, such as the liver, lungs, or kidneys, the matter has no such ready means of escape, the result being that suppurative matter becomes absorbed into the system, where it will act injuriously on the already debilitated system of the animal.

The two above-described conditions divide the malady into two varieties—the former being called *mild* or *simple strangles*, and the latter being denominated *malignant strangles*.

The name "strangles" arose from the great difficulty experienced in respiration, the breathing being accompanied by the uttering of a trumpet-like sound which was more marked during the inspiratory acts; this sound resembling to some extent to that produced by strangulation.

Symptoms.—In the case of animals having simple or benign strangles, one usually notices slight cough and difficulty of swallowing owing to the soreness of the throat. The disease is ushered in with simple continued fever. The animal is dull and dejected, disinclined to eat, and shows signs of mild catarrh. The animal is swollen about the throat, and this swelling may occupy the space between the branches of the lower jaw, or may be formed on one side of the throat only.

The benign form of strangles seldom extends beyond a period of 14 days, and it nearly always ends favourably.

In the case of animals affected with *malignant strangles*, the fever is more severe, and various glands of the body become affected, suppurate, and form abscesses. The fever may last a very long time. Malignant strangles may last one or two months, and the animal may die as a result of various complications —namely, from poisoning of the blood by formation of matter, or from inflammation of the lining membrane of the belly.

TRAINING A COLT.

To be successful in training animals, a person must be fond of them. If he likes them, he will never brutally ill-use them. Yet cruelty in breaking-in horses to saddle or harness is rather the rule than the exception. What is there too bad to be said of the man who, only six weeks ago in a Queensland

town, tore out a horse's tongue? Imagine a young colt being broken in by such a savage. There is nothing easier than teaching a young horse to stand anything in the way of work if the trainer goes about it in a proper manner; and the more high-spirited and well-bred the youngster is, the easier it is to teach it.

The colt should be accustomed to be handled as soon as it is born, and should always be spoken to and handled gently. By shouting and using a whip, the animal becomes terrified. It does not yet understand the orders given to it, but it does understand that as soon as the rough trainer appears it is bound to suffer pain; and hence comes resistance on its part, more cruelty on the part of the trainer, and perhaps the implanting of some ineradicable vice. Especially should the trainer be careful about the colt's head, so that the latter may not contract the habit of throwing up its head whenever approached with a bridle or headstall.

Stroke and rub the animal, using the currycomb and brush very gently around the legs, raising the feet and tapping gently at first, then increasing as the animal grows. If this is properly done, and the person that is training does the feeding (all others excluded), by the time three months have passed we may begin to halter-break. This is easily accomplished—after stroking the animal, very slowly pass one hand with halter over his neck, coaxing him at the same time, gradually reaching his nose, slowly drawing on and then buckling. Sometimes the animal will resist when we go to pass over its neck; if so, coax him, and let him smell the halter, until when passed over and back he no more resents it. He should now wear the halter for two or three hours each day. Always speak gently, at the same time with command, and keep your eye rivetted on the eye of the animal. Always teach the animal to go by word more than by rein. A colt will learn to go ahead naturally, but to teach him to back seems to be most difficult.

As to the most important part—how to get good horses—we must either break them or have them broken properly. Commence when very young. Like a child, they learn quickly (if intelligent), and never forget that which is thoroughly taught at this time. If we wait until they grow older, they may learn vicious habits instead of good ones.

Make a friend of your horse. Feed him always yourself, and occasionally give him little delicacies he is fond of, such as carrots and sugar. He will thus watch for your coming with pleasure instead of fear.

In breaking the colt to harness, take an ordinary bridle, minus the winkers; and if it becomes necessary to use them, the animal does not mind the change. The bit used first is the ordinary $3\frac{1}{2}$-inch curb or jointed bit. Walk up to the animal; let him see and smell every part of the harness; shake it so as to rattle; drop it suddenly to the floor, until he does not flinch. Then proceed to adjust as with the halter, but do not have the bit too tight at first. Let it remain on a short time; then follow as with the halter, always repeating the old lesson with every new one.

A colt should never know how much strength he has until he knows how to use it. If he once runs away he is never a safe horse afterwards, and, while he may to all appearance forget it, there will come a time when he will run again, and the chances are that he will do much damage. The harness for breaking and driving colts should be extra strong and heavy. The reins and bit especially must be stout enough for all possible emergencies. A straight-bar bit is good enough for a steady horse, but it cannot be depended on with fractious animals. There are numerous kinds of bits that are easy when a horse is steady, but so made as to hold the horse when he tries to run.

Poultry.

WARTS ON CHICKENS.

By "CORINDA."

There are very few breeders of poultry that have not lost many chickens every season during the hot weather from warts, and, as the disease is a very loathsome one to deal with, it behoves those who have now healthy clutches of chickens to prevent as far as possible attacks of this special disease.

Avoid giving heating food, such as oatmeal and maize, in large quantities, and twice a week disolve a small quantity of Epsom salts in their drinking water—say in the proportion of one packet of salts to one gallon of water. Continue to end of February. Give plenty of green food, and be sure their water is kept in a cool place.

Another cause of warts is large numbers of chicks being allowed to roost together in close confinement. The mosquito is generally blamed, but more are lost by allowing large clutches to huddle up together in corners of dirty fowl-houses than anything else. As warts are infectious, separate those attacked, and rub carbolic oil or a mixture of bluestone and lard over the sores, and by bathing in warm water prevent the eyes closing, or they simply die of starvation.

INDIAN RUNNER DUCKS.

These birds appear to be doing well in South Australia. One breeder in that colony says that his Runner ducks are most prolific layers, and strongly urges farmers to give the variety a trial. They eat very little, but are wonderful foragers. Mr. S. Pitman has a flock, of which nine ducks laid an average of 210 eggs each for the year; these ducks are a little gold-mine for eggs alone. They are small, averaging about 4 lb. each, which is the average weight of a common duck, but they mature very rapidly and lay at an early age, and further are excellent for crossing, producing good table birds (with Pekins or Aylesburys); also improving the laying powers of the cross-breds.

Mr. Thomas says that his ducks were keeping up the reputation of the breed as regular layers, and he thought that by judicious management no difficulty would be experienced in obtaining a supply of eggs throughout the year.

POULTRY MANURE.

What is the value of poultry manure? is the question of a correspondent of *Garden and Field*. There is considerable misconception respecting the value of fowl-yard manure, due, no doubt, to its being considered similar to high-priced guanos. On this subject Professor C. M. Aikman, in his standard work on manures, pages 325-6, says:—"Pigeon dung is a manure which, historically, is of great importance. The dung of pigeons was used as a manure by the ancient Romans; and even in modern times, more especially in France, it was considered a most important fertiliser. Despite these facts, pigeon dung is by no means a rich manure, and its composition compares most unfavourably with that of the guanos we have just been considering (*i.e.*, artificial 'guanos,' such as 'fish guano,' 'meat meal guano,' and 'bat guano.') According to Storer, it only contains from 1¼ to 2½ per cent. of nitrogen, and from 1½ to 2

per cent. of phosphoric acid, and a little over 1 per cent. of potash. The dung of poultry is just about as poor, fowl dung containing from ·8 to 2 per cent. of nitrogen, 1½ to 2 per cent. of phosphoric acid, and a little under 1 per cent. of potash; while that of ducks and geese is even poorer."

On the same subject, Professor E. B. Voorhees, M.A., director of the New Jersey Agricultural Experiment Station, in his recent work on fertilisers, says:—"It is argued that because of the very great value of guanos, which consist very largely of the excrement of wild fowl, that droppings of pigeons particularly, and of domestic fowls, should also possess a high value, and for this reason a rather fictitious value has been fixed upon these products. These differ very materially from natural guanos, and it is due probably both to the character of the food eaten by the domestic fowl and to the different methods by which the material is obtained. The birds producing the guanos feed largely upon fish—a highly nitrogenous food, resulting in an excrement richer in this element than that from the domestic bird, fed largely upon vegetable matter; and, besides, the former were accumulated in a hot, dry climate which quickly absorbs the moisture contained in the fresh droppings, thus leaving it in a much dryer state than is the case with the domestic product."

Professor Roberts, in his most excellent work, "The Fertility of the Land," after giving the results of 19 test analyses of hen manures from pens of fowls fed on various foods at the different experimental stations, says:—"Fresh hen manure appears to be worth nearly twice as much as cattle manure (fresh, and free from litter). This is due in a large measure to less moisture content; while the latter (cattle manure) has 74 per cent., the former has but 51·59 per cent. of moisture on an average. Computed at the same moisture content, the hen manure would be worth 9s. 6d. per ton (of 2,000 lb.), against 10s. 1d. for cattle manure.

Usually hen houses are kept clean by sprinkling chaff, dust, or gypsum on the floors and roosts. In such cases it may easily happen that the latter may be so abundant that the value of the manure is reduced to nearly that of cattle manure. On the other hand, unmixed hen manure, air-dried, may be worth four times as much as an equal weight of cattle manure.

Such concentrated manures may be, and usually are, worth more per unit of fertilising material than unconcentrated ones, if judiciously used, since the value of manures and fertilisers is dependent, in part, on their immediate availability, especially of their nitrogenous compounds.

If the nitrogen in a manure is only available in the advanced stages of the plant's growth, and is present in abundance, it may produce a positive injury, while, if available in the earlier stages, it is likely to be very beneficial.

Since hen manure, especially that which is unmixed with litter, and is air-dried, contains a high percentage of readily available nitrogenous compounds, these compounds are of more value per unit than are those contained in the slower acting cattle manure, provided always that they are used with judgment.

Difference Made by Food.—The experiments made at Cornell and other experimental stations show that the composition may be changed, and the value of hen manure very greatly increased, by the character of the food given. Fresh manure from a pen of hens fed on maize was worth 16s. 2d., while that from a pen fed on two parts wheat to one of cracked peas was worth 17s. 7d., and that from one fed on equal parts corn and oats was worth 21s. 8d. per ton.

The difference in value between fresh, sun-dried, and air-dried hen manure appears to vary a good deal.

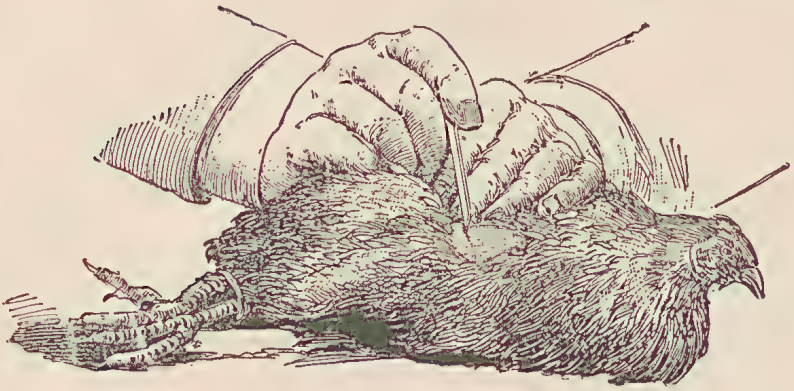
Fresh Hen Manure is valued at from 10s. 4d. to 21s. 8d. per ton of 2,000 lb., according to the food fed to the fowls.

Sun-dried is valued at 28s. 11d.

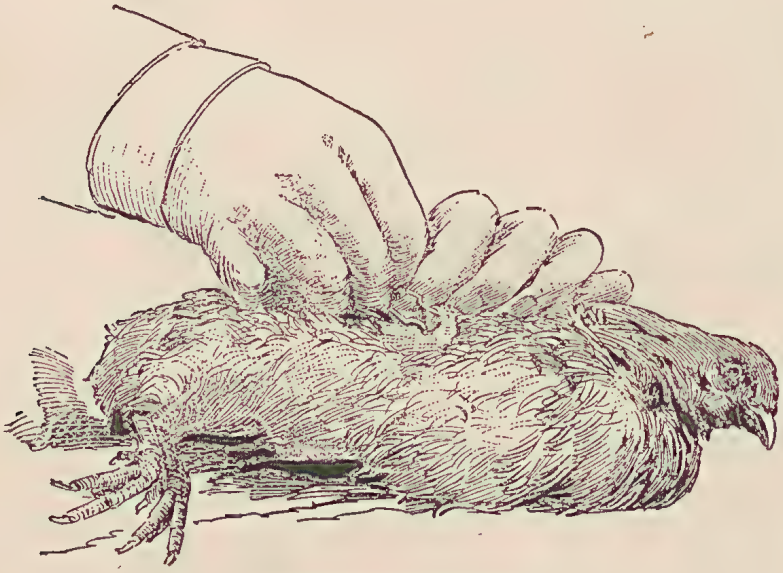
Air-dried is valued at 34s. to 41s. 8d.

The analyses show that the highest percentages of manurial properties found in any sample of fresh hen manure was—Nitrogen 1·38 per cent., phosphoric acid ·50 per cent., and potash ·41 per cent.; while the best sample of air-dried manure gave—Nitrogen 2·13 per cent., phosphoric acid 2·02 per cent., and

Plate CLX.



INSERTING THE KNIFE.



INSERTING THE SPREADER.

EXTENDING THE OPENING.

CAPONISING COCKERELS.

potash ·94 per cent. This latter sample was valued at 41s. 8d. per ton at American prices; but if the value be calculated at the present market price of commercial fertilisers in Adelaide—nitrogen 12s. per unit, phosphoric acid 2s. per unit, and potash 6s. per unit—it would be about 35s. 6d. per ton. All these calculations are theoretical, being based on fowl droppings carefully prepared, and must not be taken as the values of fowl dung under ordinary conditions.

Considering that the fowl manure under average conditions in Australia is either mixed with soil, litter, or other impurities, and that it is often lessened in value by rain, fermentation, or otherwise through lack of care, it is probable that the average value is not more than 10s. a ton.

It will be seen from these figures that, although fowl manure is not as valuable as many people think, there is an immense waste of most valuable manure going on, with little or no attempt to prevent it. According to the New York Experimental Station reports, each fowl will, on an average, produce about 6d. worth of high-class manure if it be properly cared for. Therefore every blocker or farmer with 100 fowls may save from their manure more than equal in money value to half a ton of superphosphate, although, of course, it differs in its manurial constituents.

BEST DUCKS TO RAISE.

At the Hawkesbury College, New South Wales, a number of experiments have been made in connection with the raising of poultry for table purposes and for export. The experiment with ducks resulted as follows, and shows that the American Pekin is probably the best for table purposes and for export, although costing ¾d. more for food:—

	Live Weight Eight Weeks Old.		Cost of Food.
	Lb.	oz.	d.
Pekin (Aylesbury) pair	7	10	8
Pekin (American) pair	9	7	8¾
Pekin (English) pair	7	14	8
Rouens, pair	7	1	8
Indian Runners, pair	4	8	7
Muscovy, pair	8	4	8
Aylesbury, pair	7	4	8

CAPONISING COCKERELS.

Many people are doubtful as to whether this operation is useful or not. My own experience in the matter has been but a very limited one; at the same time I am surprised that any farmer should fail to see the advantages of caponising. First and foremost, it allows of birds being held longer when the market is dull. How often it happens that one accepts any price offered for the cockerels rather than be forced to keep them in the yard worrying the hens and ill-using the chickens. Once they are caponised, they can be held till the market improves, and that without being any great inconvenience or expense to the owner. Again, a capon can be eaten at eighteen months or two years of age, and he will be as juicy and tender as a cockerel of seven months, whereas a cockerel of eighteen months is fit only to be stewed down for broth. As regards the performance of the operation of caponising, I cannot do better than append an article which appeared first in the *Queenslander* some years ago, and has gone the rounds of most of the poultry journals since. It is by far the best article I have ever read on the subject, the directions being so plain and so well expressed that any child might follow them.

What I would like to see is a good caponiser in each district, who for a consideration would go round from farm to farm every three or four months and caponise all the cockerels. Any young fellow with a taste for surgery could

learn to do it, and, when expert at it, he might arrange with the poultry people to do their birds, say, at 3d. per head. I don't think anyone would grudge that sum per head, once they understood the matter. It is a practice that should become universal in our poultry-yards for many reasons. I have heard it said that the birds do not grow any larger after caponising than they would if isolated from the pullets while still young. So far as my own experience goes, this is not true, for I have had capons nearly as large and as heavy as turkeys, while cockerels of the same age were not nearly as big. But much depends on the breed, and, if caponising became general, poultry-keepers would soon learn which were the best crosses for the purpose, and keep only those for caponising.

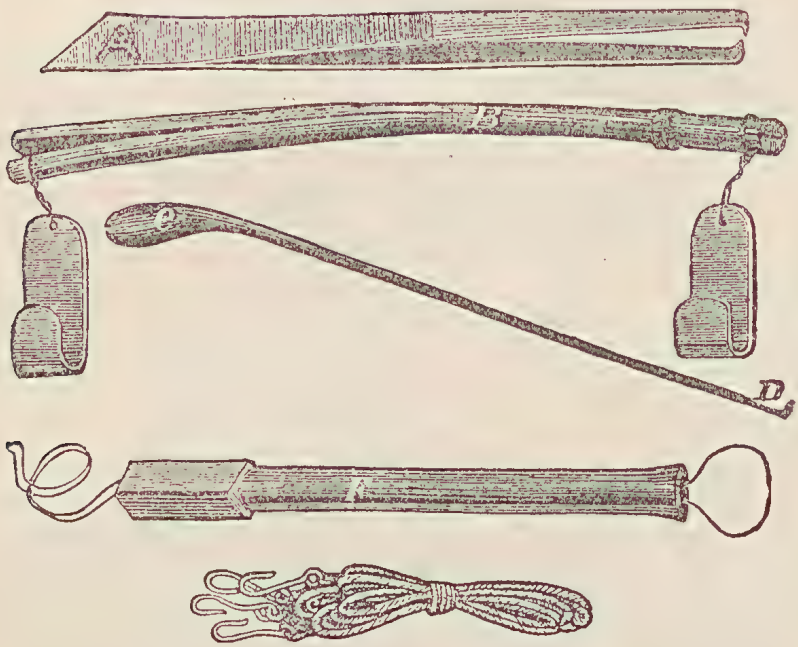
The birds I had done were Brahma Dorkings and Malay Brahmas, but there are even better crosses nowadays.

CAPONISING—HOW IT IS DONE.

[*From the Queenslander.*]

Caponising has not been much practised in Australia, but those who have performed the operation for experimental purposes have been impressed with its importance. Whether caponising has the effect of improving the value of the birds for the market is a question that is much disputed; but the balance of opinion is in favour of the operation. Its opponents allege that if the cockerels are separated from the pullets as soon as the sexes are distinguishable, and always kept apart afterwards, they grow just as large as capons, and of finer flavour. However that may be, it is certain that those who habitually caponise all their young stock intended for the table realise a higher average price than breeders who trust to the method of isolation alone. In Queensland of late years much attention has been directed towards caponising, and many poultry-keepers are anxious to test it.

CAPONISING INSTRUMENTS.



A, Knife and Forceps combined. B, Whalebone spreader. C, Cords for fastening birds, furnished with most sets but not used by us. D, Hook for tearing the thin skin. E, Spoon or Elevator. F, Canula, or Tube, showing, horse hair loop which is passed over the testicle projecting from the point, and the part grasped by the fingers projecting from the square top or butt, by which the tube is held.

Sets of instruments are usually made to order, but their cost is out of all proportion to their actual value, £1 being charged for a set. In America caponising sets form one of the regular lines in ironmongery stores, and they are to be had, we believe, in Melbourne, so that should there be any prospect of the operation coming into vogue in this colony it is likely that local ironmongers or cutlers will find it to their advantage to import the appliances and sell them at a reasonable price. [We understand that all the necessary instruments for caponising may be purchased from Messrs. Nobb and Co., Queen street, Brisbane, and that they furnish full instructions by Spratts Limited.—Ed. *Q.A.J.*] More than two years ago we described the operation as usually performed in the United States; and as many correspondents have expressed a wish for the republication of the article, it is given below, with explanatory illustrations.

The operation is best performed upon chickens about three months old, although it will succeed, if carefully done, with the majority of fowls when they are ten or twelve months old. As with many other operations, this is one that can be learned most readily by seeing it done, and we advise those who would undertake it to procure instruction wherever it is available. Still, if one has a little confidence, he will meet with success if the directions here given are carefully followed. In the first place, a table is needed, in which a few screw rings are inserted at convenient places. These are furnished with broad tapes by which the bird is securely held during the operation. The best plan for a novice is to kill a bird and operate upon that first, in order to learn the position of the parts. Lay the dead bird upon the table, dispose it as hereafter described, and then place the screw rings where they would be needed to secure a live fowl. One or two will be required to hold the wings, and one for each leg; six will be all that will ever be necessary. Place the bird upon the table, and fasten it down upon its left side, as shown above, where the rings and tapes are seen. The spot where the opening is to be made is shown in the Plate. Here the feathers are plucked, and an opening is made through the skin with a pair of sharp-pointed, long-bladed scissors. We have found these better than a knife. The skin is drawn to one side, and an opening is made with the scissors between the last two ribs for 1½ inches in length, great care being taken not to wound the intestines. The ribs are then separated by the spring hooks, B, so as to expose the inside. The intestines are gently moved out of the way with the handle of a teaspoon, and the glands or testicles will be seen attached to the back. The tissue which covers them is torn open with the hook, D, aided by the tweezers, A. The gland is then grasped with the forceps, A, and the cord is held by the tweezers. The gland is then twisted off by turning the forceps, and when this has been done the other one is removed in the same way. Care must be taken not to injure the bloodvessel which is connected with the organs, as this is the only seat of danger in the operation, and its rupture will generally be fatal. The hook is then removed, and if the skin has been drawn backward at the outset it will now slip forward and cover the inner skin which covers the intestines, and close the opening. No stitching is needed. A few feathers are drawn together on each side of the opening and plastered down upon the skin with the blood, where they will dry and form the best possible covering to the wound, which will begin to heal at once. The bird should be fed with a very little soft bread and milk for a few days after the operation, but should have plenty of water. For two nights and one day before the operation no food or water should be given to the birds; this will greatly facilitate the work and reduce the chances of loss. The operation, after a few successful trials, may be performed in less than one minute, and by the use of the rings and tapes no assistance is needed. Capons may be made to earn their food by fostering young chicks, to which business they take very kindly. To bring them to their full and most profitable size, they should be kept until the second year. By giving them cornmeal steeped in warm milk, and providing a warm house, they will grow during the whole winter; and their flesh will become very white, sweet, and juicy. A good capon of light Brahmas will weigh 12 lb. to 15 lb. at twenty-two months old.—*Bulletin of the Queensland Department of Agriculture, No.* 8.

GENERAL INFORMATION.

By "CORINDA."

It is particularly necessary in Queensland during our hot summers to provide shelter for our fowls, so that during the intense heat of the day they can escape the sun's fierce rays. I very often notice how many people who keep fowls forget that they, like ourselves, require this protection. A few short saplings as uprights and two or three crosspieces, to form a rough support on which can be thrown a lot of well-leaved branches or some old sacks or bags sewn together, are all that is necessary; and your fowls will be very grateful for the little trouble it gives you. Their water must also be placed in a cool spot, as water contaminated by the hot sun is very injurious, and almost sure to give them diarrhœa, which is often the forerunner of other fatal diseases. I might here mention that, for such attacks, their food should consist of scalded rice, and they should get a teaspoonful of brandy and powdered camphor, if available, with a little water. Flour and water made thick is very effective.

In feeding fowls, nothing is better for the morning meal (which, by the way, should be as early as possible) than all the household scraps, potato parings, &c., boiled in the bottom half of a kerosene tin with a wire handle kept for the purpose, and mixed with two parts of pollard to one of bran, until it is what might be termed "crumbly moist." Never give it in a sloppy or sticky state. To avoid the latter, the water used for boiling the scraps in must be boiling when the pollard and bran is added. In the evening their meal should always be grain—I prefer a mixture of maize and wheat—spread well about, so that all the fowls get a fair share. If they have not got a grass paddock to roam about in, lettuce or green stuff of some sort must be provided, and, for a change, liver chopped up fine is wholesome and greatly improves the egg supply, particularly in cold weather. Do not feed your fowls at the front or back door, or they will cause a lot of trouble with dirt, apart from the annoyance of their continually begging instead of scratching about for insects and grit, which are so very essential to their good health.

If you have only a small enclosure for your fowls, do not keep many. If you have, say, a cock and six hens and they lay a fair average number of eggs for you, do not imagine that by getting another six hens you will double your supply of eggs, as that has been proved over and over again to be a mistaken idea. To 1 acre of ground I should recommend 40 fowls. If you do not want broody hens, purchase Leghorns or Andalusians. The Black Hamburg, if pure, is also a splendid layer and shows no disposition to sit. I prefer the Black Hamburg to either silver or golden spangled, as they are hardier and lay a larger egg. I may, however, state my opinion that the Leghorn (either brown or white) is the most reliable and consistent layer, particularly when they have plenty of room, of any breed of fowls obtainable.

Many people lose a lot of their fowls during the moulting season, which will soon be here; so, for the benefit of the amateur, I will give a few hints that, if acted on, will assist the birds to have a quick moult and reduce the risk of losing any through illness very considerably. Feed well, and every other day mix a small quantity of cayenne pepper with their food, and give plenty of chopped raw onions. Supply a sulphur dust-bath, and put a piece of old iron or some rusty nails in their water. Before concluding this contribution, I must lay great stress on the absolute necessity at this time of the year for keeping the fowlhouses particularly clean. A good bucket of lime, with about a wineglassful of carbolic acid mixed with the wash, should be applied to all the interior, including the nests and perches, which should be wiped over with kerosene. Do not allow any broody hens in the fowlhouse in the hot weather, or it will be almost impossible to keep insect pests away. Sprinkle dry soil or sifted ashes on the ground under the perches, and rake out at least once a week. If people wish their fowls to be healthy, and the occupation to be interesting and lucrative, this small amount of labour is, as I stated before, absolutely necessary.

POULTRY NOTES.

Onion Peel for Hens' Nests.—The outside peel of onions is often burned because it is hard to find a use for it. Always put a few of these in hens' nests, using only the driest parts for this purpose. It makes the nest disagreeable if not destructive to the hen lice, and sitting hens thus treated can hatch their little flock in peace.

For Scales on Hens' Legs.—Mix equal quantities of yellow sulphur (ground) and best lard together, taking care that they are well blended, and use as an ointment, applying some to the scaly legs every day for seven or ten days (as required); or equal quantities of salad oil and kerosene (mixed) may be applied with a brush to remove the rough scales.

The way to best get rid of all bad odours and impure air of the fowl-house is to disinfect the house, and no better substance can be employed in this than a generous supply of whitewash. It is not only the best way, but it is the cheapest. To make it do its best it should be used without stint on the inside, on the nest-boxes, and on the roosts, and the floor may have some of it without doing any injuiry to it. What would be better for the floor will be air-slacked lime.

It is a good plan to sprinkle the fowl-house now and again with a solution composed of copperas. This drug is very cheap, and it dissolves readily in water. A very good way to apply this is by the use of a sprinkling can. It will kill a bad odour at once, and it is also fatal to disease germs. Do not be satisfied with plenty of pure air, but disinfect the premises. Pure air is good, but the bad air wants to be made good or made harmless.

Hens running without males with them lay just as many eggs as if there were a dozen males in the flock.

Viticulture.

THE VINTAGE.

By E. H. RAINFORD,
Viticultural Expert.

Once more the vintage is upon us, and once more the writer returns to the charge to point out some of the defects noticeable in the operations conducted in several places, and to suggest some improvements even at the risk of being thought troublesome. Some of the points were touched on in the article in the *Agricultural Journal* for January, 1899, but they will bear repetition.

CLEANLINESS OF PLANT.

First and foremost comes cleanliness of plant, without which the must will certainly be infected with germs of bacteria, and this will affect the quality of the new wine more or less according to their number and energy.

The following advice was given last season:—

"The first point to be attended to before the vintage commences and a single grape is picked is to see that the casks, vats, crusher, press, and buckets, as well as the cellar itself, are in a condition fit for use. The danger of using unclean plant is twofold. First, the wooden material saturated last season with must may have become mouldy, which would communicate a disagreeable taste to the wine; secondly, dirty plant may be swarming with germs of bacteria or

their spores, which would not fail to multiply in the must, and thereby af its soundness and quality. Where vats and casks have a decidedly bad sm the reader is referred to last month's article in this *Journal* for their treatm When they have only the usual smell of dry cask, they should be washed and scrubbed with a bucket or two of water acidified with sulphuric acid. vat-full can be prepared beforehand in the proportion of 2 lb. of acid to gallons of water. Wash all the plant down with this solution; it is too w in acid to affect the ironwork, but is a splendid germ-destroyer and sweete of tainted wood. If the vigneron cannot or will not use the acidified water can wash the plant with a 5-per-cent. solution of bisulphite of lime (obtain at breweries). If a large fermenting vat has become mouldy and green ins as will happen if kept in a damp place, it is well to burn the interior surf with a plumber's lamp, and then well scrub down with salt water, sulph acid solution, or bisulphite solution.

"Cleanliness of surroundings should also be attended to, keeping cellar clean and sweet by occasionally whitewashing the walls and sweep up all refuse—bruised grapes, husks, &c., lying about, breed countless germ

RED WINES—DRY.

The production of clean, light, and medium red wines of good bouquet flavour requires more attention to details than is generally shown by our vig rons. The climate of Queensland tends to increase the production of tan and extractive matter in the grape, with a corresponding decrease in tart acid, the reverse of what is required in a clean, sound claret. The art of vigneron must then be directed to reducing the one and increasing the oth The want of acidity is a universal fault which accounts for the flatness of m Queensland dry red wines, as well as for the absence of bouquet; for it is ethers produced by the action of acids on alcohol which give much of bouquet to wine, consequently where there is low acidity there is want perfume. A must intended to produce a wine of the claret or Burgundy c must not contain less than 8 per mille of tartaric acid, and Queensland m generally contain but 6, so that the acidity should be increased by 2 per mill

There are two ways of doing this: Either by vintaging the grapes not p fectly ripe, or by the addition of acid to the must. The former method recommended when the fully ripe grapes run to a density beyond what required for the production of light and medium wines – that is, from 18 to per cent. of sugar; but if the usual density is insufficient for this course to followed, tartaric acid must be added to the must. The remarks on m acidity published last year are reproduced here for vignerons' convenience, bu is advisable that they should procure the necessary apparatus to test for acid themselves, as, after a few trials, they will find no difficulty in using it, and is a necessary part of a vigneron's outfit:—

"ACIDITY OF MUST.

"Mention was made in the article for this *Journal* for February, 18 that for the germs of vinous fermentation to do their work efficiently the c stituent parts of the must should be in equilibrium; and when the proportion tartaric acid falls too low, the *Saccharomyces* lose some of their vitality, wh that of the noxious germs is increased. In addition to the effect upon ferm tation, the wine will be flat to the taste, imperfect in colour, and wanting bouquet, and, moreover, it will always be susceptible of change and deteri tion. Wine made from must with sufficient acidity will be of a lively colo fruity, and with a pleasant bouquet, besides keeping much better.

"If grapes are allowed to become too ripe, they lose acidity, and the m will be deficient; on the other hand, if in some places grapes are vintaged early they will lose in sugar, so that it is preferable to add a little tartaric a to musts of ripe and over-ripe grapes—a practice permitted in all wine-maki countries.

"Again, in wet seasons the must will be deficient in tartaric acid, and also that from grapes affected with cryptogamic diseases (oidium, black spot, &c.)

"Conversely, during very dry seasons, or when grapes have matured with a long spell of dry weather and burning sun, the must rarely requires any addition of acid.

"The quantity to be added will, of course, depend upon the amount already contained in the must, and this can only be known by testing with a proper apparatus. For those who do not possess the apparatus and practical knowledge of testing, the best plan is to send an average sample of the grapes to be vintaged to this Department a day or two before picking to be tested, and the acidity will be made known by return of post. Must from the generality of wine grapes requires from 8 to 10 per mille of tartaric acid, and that from Jacquez or Lenoir not less than 12 per mille, otherwise a portion of the colour will not be fixed, but will deposit in the lees. One per mille may be calculated as 1 lb. per 100 gallons, so that, if a Lenoir must only contains 10 per mille of acidity, 2 lb. of tartaric acid must be added to each 100 gallons of must if all the colour is wanted; if the amount of colour is immaterial, the acid need not be added, as 10 per mille is sufficient for the preservation of the wine. On the other hand, if a Hermitage or Espar must only contains 6 per mille of acidity, 2 per mille should be added, as its acidity is too low to ensure soundness and quality.

"The acid should invariably be added to the must before fermentation and not after, as in the latter case it only communicates a harsh sourness to the wine without benefiting it in any way. The best method is to sprinkle it on the grapes as they are crushed, a little at a time."

CRUSHING.

Remove as much unsound fruit as possible, as it contains lactic, acetic, and other ferments. If time will not allow the bunches to be picked off, throw out doubtful bunches and use them for the fortified wines or for distillation. See that the rollers of the crusher are near enough to well break up the berries, yet insufficient to break the seeds. Give a certain amount of fall to the juice to allow it to absorb oxygen necessary to a healthy fermentation.

STALKING.

For the production of clean, tasty clarets, &c., it is absolutely necessary in Queensland that the stalks be removed. A great deal of the coarseness peculiar to some of our wines arises from not doing so. The husks contain all the tannin that the wine requires, and the superabundance added by vatting with the stalks spoils the *finesse* of the wine, and also exposes it to recurring turbidness in after life whenever exposed to the air. Vignerons must have noticed this peculiarity in some of their heavier wines, and undoubtedly vatting with the stalks is answerable for it. An excellent machine is sold at a reasonable price in Adelaide, which crushes and stalks simultaneously, and vignerons are advised to invest in one; otherwise the stalks should be picked as the bunches are crushed, but there is a loss of time and must in doing so, as the half-crushed fruit is detached with difficulty. Rubbing the bunches through a wire or string netting fixed on a frame 3 feet. square by 8 or 9 inches deep, before crushing, is an effective operation, and for years this apparatus was used by the writer. If readers will only make a cask or two of wine with the stalks removed, they will see for themselves the improvement obtained.

VATTING

This is a very important part of the process of making red wine, and last year's remarks are reproduced for vignerons' consideration. Attention is specially called to the undesirability of continuing the vatting after the wine is sufficiently coloured, as, by doing so, a larger amount of extractive matter is added to the wine, with a corresponding loss of smoothness and clean taste:—

"When fermenting on the husks, avoid filling the vat too full; a space of

8 to 12 inches should be left between the 'cap' and the top of the vat. The object of this is to prevent access of air to the husks which are forced up by the escaping gas out of the must, and which would promptly begin to acetify. The space between the 'cap' and the top of the vat is filled by carbonic acid gas; and if a wooden cover is placed on the vat, it will prevent this stratum of gas being displaced by currents of air. Under any circumstances, the 'cap' should be frequently submerged to prevent acetification of the husks as well as to give as much colour as possible to the wine.

"But the best system by far for obtaining these results is that of the submerged 'cap,' which is now being largely adopted, and can be managed at a small cost. At 6 or 8 inches below the edge of the fermenting vat, if a small one (more if it is of large size), four stout wooden buttons are screwed on to the inner side at equal distances. The screws must be strong enough to stand a considerable pressure, and the buttons must be of hard wood, 4 or 5 inches by 2 inches, and just loose enough to turn. Now make a stout head to the vat rather smaller in circumference, so that it will slip in and out easily, and on its edge cut four equidistant notches corresponding in width and position to the four buttons, which when turned will prevent it returning; if the vat is a large one, it can be made in two pieces, but must be provided with stout fastenings to hold it together. The head must be drilled pretty freely with the centre bit to allow the escape of the gas and must. Having filled the vat up to just below the buttons with the crushed grapes, slip the head over the buttons, and give them a half-turn to shut it down. As soon as fermentation begins, and the mass begins to swell in bulk, the head will keep back the husks and stalks, but allow the must as well as the carbonic acid to pass through the holes; the head will be covered with must, and the 'cap' kept entirely out of contact with the air. In this way no acetification of the 'cap' can possibly take place, as the *Mycoderma* find no resting place for their operations, and the wine extracts from the husks the utmost amount of colour. As the fermenting mass will cause considerable pressure on the head, care must be taken to drill enough holes to favour the escape of gas, and to put strong screws or bolts to the buttons.

"DURATION OF VATTING.

"It is worse than useless to allow the vatting to continue after the required colour has been extracted from the skins, as every hour that passes increases the danger of acetification of the 'cap' when exposed to the air. A short vatting gives a lighter-coloured wine, but of more *finesse* and of quicker maturing quality.

"A longer vatting gives a darker, harsher, and longer maturing wine.

"When all the colour has been extracted from the skins (which can easily be ascertained by drawing a sample from the middle of the vat, either by spigot or syphon, at intervals of a few hours, and noting if the wine is darker), it should be racked off to finish its fermentation in the cask. Many vignerons continue the vatting until the saccharometer marks zero, but why they do so is a mystery. Once the wine has extracted all the colour from the husks, or all that is required, what is gained by continuing the vatting? If it is with the idea that the wine will not finish its fermentation without the husks, in that case there would be no dry white wines. Yet we see that must, run straight from the mill into the casks without vatting, ferments out all its sugar without difficulty. It is simply a custom, and a mistaken custom. Nothing is gained by it; in fact, there is loss of alcohol and increase of volatile acids in the wine."

A modification for submerging the cap was seen by the writer a short time ago at Rutherglen and Albury, which is a decided improvement on the above. Instead of using four buttons, four supports, 6 by 3 by 3 inches, are screwed at equal distances to the inside of the vat. The perforated head rests upon these supports when the vat is filled up to their height with the milled grapes, and the head is prevented from rising by wedges driven between it and the side of the vat. Of course the head is made sufficiently loose for the wedges to act. This system prevents the head from falling in when the vat is emptied.

TEMPERATURE OF FERMENTATION.

The temperature at which must ferments into wine exercises as much influence on the quality of the product as its acidity and other circumstances. Both too low and too high a temperature are hurtful, but the former is hardly likely to occur in this colony; the latter, which is far more dangerous, is very possible.

The best temperature for must to ferment at is between 80 and 90 degrees, but up to 95 degrees the germs will still do their work, though more sluggishly; if the temperature mounts higher, the ferment germs become paralysed, and the bacteria, which are ever present in fermenting liquids, get to work and more or less diminish its quality and soundness. On this point some of last year's remarks are reproduced:—

"Let us examine for a moment how a high temperature affects the fermenting must. When grapes are crushed, the must is sown with the spores not only of the *Saccharomyces ellipsoideus* adhering to the skins, but also with the spores of the *Mycoderma* (or mildew), and the bacteria of lactic, acetic, and other fermentations. These latter may be adherent to the fermenting vats and other plant in use, or may be conveyed by the atmosphere. So long as the must is kept at a temperature favourable for the development and reproduction of the *Saccharomyces*, the inimical germs are, so to say, crowded out and their functions impeded. The sugar is transformed into alcohol and the other products of vinuous fermentation, and a good sound wine is the result. But as the temperature mounts and the vitality of the *Saccharomyces* becomes weakened, the bacteria, which at first were unable to find room, begin to multiply, especially if the must is deficient in acidity. There arrives a point at which the work of the *Saccharomyces* ceases—they are either killed or paralysed: the must ceases to ferment. All this time the lactic and other germs, which can live and perform their functions in a much higher temperature than the *Saccharomyces*, are converting the sugar into lactic and acetic acids, with a more or less disastrous effect upon the quality and keeping powers of the wine. The *Saccharomyces* never properly resume their functions after the wine has cooled down, and it remains muddy with a sweet acid taste. Frequently, when too high a temperature has caused the collapse of the vinous fermentation, what is known as mannitic fermentation commences, which is the work of a bacteria which converts the sugar into mannitic and acetic acid.

* * * * *

"The cessation of the vinous fermentation, as described above, is known as 'stuck' wine, and prompt measures must be taken if it is to be saved. The best way of proceeding is to rack off the wine into two or more vats, and to add to it an equal quantity of fresh must, if possible, in a fermenting condition; if the fresh must is not fermenting, put into each vat several gallons of fermenting must from another source, so as to restore the vinous fermentation as quickly as possible, and not allow time for the lactic or other germs to get into play, at the same time cooling the vats as explained later on.

"The good old proverb, 'Prevention is better than cure,' is applicable to many things in life, but to none more than to wine-making; and if the vigneron neglects to bear it in mind, he will have to cogitate on another which says, 'What can't be cured must be endured,' so instead of having to tackle a 'stuck' vat, and spoiling wine, with all the attendant hurry scurry and anxiety, it is better to take those precautions which will prevent it.

COOLING ARRANGEMENTS.

"If the weather is very hot, do not gather and crush the grapes during the heat of the day, but only in the morning, or, if gathered all day, leave them to cool for a night.

"Avoid the use of too large-sized vats; those of 500 gallons capacity are quite large enough for a moderate-sized vineyard, and these can be kept cool by very simple means. Should the temperature within rise too high, vats of larger size than this will probably require a cooling apparatus, unless in cool,

underground cellars. Should it be necessary to cool small vats up to 500 gallons, it can generally be done sufficiently by enveloping them in wet sacking, sprinkling it occasionally with water. As it dries, the evaporation from the sacking takes off a certain amount of heat. Better still is to have immersed in the must a metal (tinned) cylinder containing a refrigerating mixture of ice and salt, which should be occasionally stirred. A few pounds of ice used in this way will considerably reduce the temperature when it has risen to a dangerous point, care being taken not to upset the mixture into the vat. For vats of larger size, refrigerating machinery or the circulation of cold water through a coil immersed in the vat are indicated; the first is costly and only found in large well-found cellars, but the second can be managed at a reasonable cost by those who have a supply of cold water on the premises. The coil should not be of piping too large in diameter, otherwise a large part of the water will escape without doing its work. The smaller the piping, the greater the cooling surface exposed to the must, but, of course, more piping will be required than that of larger diameter. The water can be sent through by gravitation or by pumping. It must not be sent through too quickly, or it will not do its work. Do not put the coil at the bottom of the vat, but as near the surface as possible; the husks which have risen to the surface and have formed the 'cap' always constitute the hottest part of the fermenting mass. When large quantities of must have to be fermented, and small vats would take up too much room, slate tanks and cement-lined concrete tanks do excellent service, as the heat generated by the fermentation in them is carried off so quickly that the temperature seldom rises to a dangerous point."

PRESSING THE MARC.

Lose no time in pressing the marc, as acetification quickly sets in. When possible, allow the must from it to ferment separately, as, if the marc has slightly soured, the must from it, if added to other wine, might contaminate that also. After clearing, if found to be sound, it can be blended with the other.

WHITE WINES—DRY.

If a light white wine of the Chablis or Hock class is desired, the best varieties of white grapes should be chosen, giving a density of from 20 to 23 per cent. of sugar, and run through the mill as quickly as possible if the true greenish white colour is desired, and under no circumstances should the wine be fermented with the husks, or the quality will be deteriorated. See that the must contains not less than 8 per mille of acidity, and, to get this without adding tartaric acid, vintage the grapes while still a little green. If the must is allowed to stand in a vat for a few hours after pressing and is then racked off, and the thick slimy matter deposited into the fermenting casks, a much cleaner and better quality wine will result. This is the usual treatment for light white wines in Europe. After the must has been decanted, the deposit can be put with the marc into the press. The vat should be washed out with acidulated water or heavily sulphured, otherwise the next must put in it will ferment before it has time to clear itself. Should vignerons desire a wine with more colour in it, and decide to vat it with the husks, the stalks should be removed first, and the must only allowed to ferment long enough to raise up the cap, otherwise too much tannin will be absorbed, and the wine will darken in colour each time it is exposed to the air, necessitating a lot of fining eventually.

Be very careful that this class of wine be fermented and stored in casks that have only stored white wines; if casks that have contained red wines must be used, prepare them as follows:—

Dissolve 6 lb. of soda crystals in 4 gallons of boiling water and pour hot into the cask to be de-coloured, rolling and turning it on all sides at intervals until the solution is cold. Then empty and rinse first with boiling water, and then with cold water, and, if not used directly, it must be sulphured. The cask must be thoroughly rinsed, or risk is run of the wine being browned.

Another receipt is:—Pour a bucket of boiling water into the cask, and then, with care, pour in a bottle of sulphuric acid, roll for an hour, then empty and rinse with cold water several times.

For strong dry wines like sherry, the must should be of high density, and fortified towards the end of the fermentation with from 2 to 5 per cent. of the best and strongest spirit of wine procurable, of pure taste and smell, and a second fortifying should be given later on.

The must is not vatted, but run through the mill into the press, and then put into the fermentation casks. The acidity of the must need not be increased, but remain as low as 5 or 6 per mille, as bacterial developments are not to be feared if the must is fermented in small bulk without the husks, and cleanliness has been observed in all the operations. A higher acidity than 6 per mille would be out of place in a sherry. Many varieties of vines are grown in the Xeres district for sherry-making, but of those imported last year by this Department only the Pedro survived, through bad packing. A fresh lot of Polomino has been ordered, which, with the Albillo, form the main crop of the Xeres vineyards.

The writer takes this opportunity of observing that all his suggestions and recommendations are directed to those who make their wines from the pure juice of the grape, and they do not apply to the sugar-and-water concoctions of some. The circumstances are quite different in the latter case, and the ordinary rules of wine-making do not apply to them.

SWEET WINES.

The method ordinarily adopted in Queensland for making sweet white and red wines—*i.e.*, adding a quantity of cane-sugar to the must—is to be deplored, as the wines can never be of good quality; they are sickly and cloying, and the alcohol and ethers developed by the fermenting cane-sugar affect the head and the stomach. The methods adopted by all wine-making countries for the production of sweet wines are:—

1. Partial desiccation of the fruit by torsion of the stalk or exposure to the sun for a few days on mats.
2. Addition to the must of concentrated juice to raise its density.
3. Checking the fermentation by addition of alcohol, which leaves a certain amount of grape-sugar undecomposed in the wine.

The first method produces far and away the finest wines, but is troublesome and too costly for Australia.

The second makes good sweet wines if care is taken to avoid burning or scorching the must in the concentration.

The third is easy, and makes excellent sweet wines, but can only be adopted by those who have a still.

Whatever excuse there may be for those who sweeten their wines with cane-sugar, who do not possess a still, there is none for those who, having a still, continue to do so. If the vigneron will try the effect of checking the fermentation with spirit, he will not use cane-sugar again.

The amount of alcohol to be added to the must entirely depends on its density, and on the strength of the spirit. It may be taken that under ordinary circumstances fermentation will decompose 26 per cent. of grape-sugar in must; if there is more than 26 per cent., the wine will be sweet in proportion to the amount of undecomposed sugar. European sweet wines of the Muscat and Malvasia class contain 10 to 15 per cent. of undecomposed sugar, with a strength of from 27 to 29 degrees of proof spirit. If, therefore, a sweet wine is to be made from grapes partially dried or from must sweetened with concentrated must, it should have $26° + 10° = 36°$ or $26° + 15° = 41°$ of density before fermentation, which will transform 26 degrees of sugar into 27 degrees of spirit, leaving 10 to 15 degrees of undecomposed sugar in the wine.

When, however, the wine is made sweet by addition of alcohol, a different calculation is required—26 degrees of sugar are transformed into 27 degrees of proof spirit by fermentation; and as it is required to leave 10 to 15 degrees of sugar undecomposed, the equivalent then of this amount of sugar in proof spirit must be added to the fermenting must—in other words, 10·4 to 15·6 degrees of proof spirit—which will give the required sweetness. That is for a must of 26 degrees, but if the must is, say, 23 degrees of density, the equivalent of 3 degrees more of sugar in proof spirit must be added, or 3·1 degrees.

The spirit of wine available is, however, overproof of varying strength, so a fresh calculation is necessary to determine the amount required. Suppose it is 30 degrees overproof; then, as 100 gallons of this spirit are equal in strength to 130 gallons of proof spirit, or 10 to 13, the amount required must be multiplied by 10 and divided by 13.

EXAMPLE.—In a cask of 100 gallons of must of 23 degrees of density it is desired to leave 10 degrees of undecomposed sugar after fermentation has ceased; to attain this, 10·4° + 3·1° or 13·5° of proof spirit should be added; but the spirit is 30 degrees overproof, then $13{\cdot}5 \times \frac{10}{13} = 10\frac{1}{2}$ gallons of 30 degrees overproof to be added to 100 gallons of must.

ANOTHER EXAMPLE.—In a cask of 100 gallons of must of 25 degrees density it is desired to leave 15 degrees of undecomposed sugar with a spirit of 35 degrees overproof: 15·6° + 1·1° = 16·7° of proof spirit: $16{\cdot}7^\circ \times \frac{100}{135} =$ 12·4 gallons of spirit 35 degrees overproof.

And now for a note of warning. The saccharometer shows a density which is not all sugar, but includes gum, albumen, extractive matters, &c., which vary in quantity in different soils and in different seasons. The writer has observed that in this colony these substances are in the must in greater abundance than in Europe, so that, in calculating the amount of alcohol to be added to the must, this fact must be kept in mind and allowance made for it by a slight increase in the dose of spirit. It is better that the wine should be a little sweet than too dry, as it can always be blended if necessary.

Sweet ports are made in the same way, except that less undecomposed sugar is allowed to remain in the wine, and it is more highly fortified subsequently. Care must be taken, when distilling spirit, to reject the first and last that comes over, as it is contaminated and will affect the wine it is put to; the aim of the vigneron should be to produce as pure and tasteless a spirit as possible.

COLONIAL TIMBERS FOR WINE CASKS.

FROM the *New South Wales Agricultural Gazette* we extract the following "Report on Colonial Timbers to be used as Wine Casks," by Mr. L. Frere, St. Hilaire Vineyard, Thurgoona:—

In March, 1897, a consignment of colonial timbers was sent to me by the Department of Agriculture, to be tried as to their suitability to be used for casks for storing wine.

Four sorts of timber were sent—namely, Cudgerie (*Flindersia australis*), Silky Oak (*Grevillea robusta*), White Beech (*Grevillea Leichhardtii*), and Blackbutt (*Eucalyptus pilularis*).

The timber arrived quite green, and could not be used for experiments of the 1897 vintage. It was stored for eight months, and kept in a shady place, and then made into eight casks, of a capacity of 500 gallons each, which were all filled up with wine of the 1898 vintage.

To determine the value of timber for wine casks, the first consideration is to see how it is suitable for cooper's work; and second, the influence of the timber on spirit when in contact with it. I had for that purpose 1 oz. of chips of each sort of timber placed in a quart of brandy, 20 per cent. overproof, and

kept in maceration for two months. Thirdly, we require to ascertain the influence of the timber for bad or good on the quality of the wine stored in it. To obtain this result the casks, before being filled with wine, were steamed for six hours, and rinsed twice with cold water after steaming. After each racking the same wine was returned to the same cask, and kept in it for a period of nine months, which is quite sufficient to show any fault coming from the timber, if there be any.

CUDGERIE.

Cooperage.—Timber brittle. Must be employed green; if worked dry could not be bent without breaking. Large quantity of sap wood had to be taken off. It makes casks of good appearance, and there was no leakage through porosity.

Maceration in Brandy.—After two months' maceration the brandy had very little colour, a slight agreeable aroma, and a bitter taste; it becomes of a slight whitish colour when mixed with two-thirds of water. It would be unsuitable to store brandy, but, as all extracts of wood are far more soluble in brandy than in wine, I had no hesitation storing wine in it.

Wine Storage.—On 5th March, 1898, two casks of Cudgerie timber were filled with must of Verdeilho and Ancarot grapes mixed. The first racking was made at the end of April, and the same wine pumped back into the same cask. It was racked again two months later. The wine was tasted then, and compared with a wine of same sort kept in an old oak cask; there was no difference in taste. The same comparison was repeated in September and December without any noticeable difference.

A cask of Cudgerie was also filled with red must, made of Malbec grape. The wine was strong and rough, and was not likely to show a difference of taste due to the influence of timber when a white wine more delicate had not been affected.

The strength of the wines tried in December was: White wine, 12·7 per cent. absolute alcohol; red wine, 13·2 per cent. absolute alcohol.

SILKY OAK.

Cooperage.—It is very easily worked. It is the best of the four kinds for working. It makes nice-looking casks, and keeps its shape well; must be worked green or else would crack; has a little sap wood, but when full never leaked through porosity. One year after being made none of the hoops have moved; the timber did not shrink at all.

Maceration in Brandy.—The colour of brandy was still light after two months' maceration. Flavour agreeable; slightly bitter taste. When mixed with water the brandy becomes very cloudy, and forms a strong deposit of sediment. This timber would be quite unsuitable to store brandy.

Wine Storage.—Reisling and White Shiraz were used to fill two casks of Silky Oak. They were, as the wine stored in the Cudgerie, racked and returned into the same cask, so they had also nine months' storage in the same casks. After that time they were clear, and I could find no difference with wines of the same kind and age kept in other oak casks. I was afraid that the effects of the spirit getting cloudy when mixed with water should be also felt in the wine, but it was not so. The wine cleared early, and when clear and mixed with water it kept its limpidity.

WHITE BEECH.

Cooperage.—Easy to work; very soft; does not suit at all for casks. One only was made; it came quite out of shape, and the part on the stand became quite flat. Having been kept empty for a fortnight, it was with the greatest difficulty that it was made fit to hold wine again.

Maceration in Brandy.—The brandy was coloured dark; pretty strong aroma, not unpleasant; slightly bitter; becoming whitish when mixed with water.

Wine Storage.—The same red wine was kept for eight months in the cask without any difference of taste or colour compared with other wines in oak casks.

BLACKBUTT.

Cooperage.—Very cross-grained; very hard to work. It could not be dressed smooth. It was riddled with worm-holes, and for a long time leaked through worm-holes and through joints, not being dressed smooth. The cooper who made the casks said that he had the greatest difficulty to work it, and even then, after very great trouble, the work was unsatisfactory.

Maceration in Brandy.—The brandy was dark in colour, good aroma, and good taste, not bitter, like the other timbers. Mixed with water the brandy keeps clear, and forms no sediment.

Wine Storage.—One cask only was made of blackbutt; it was filled with wine of Black Shiraz, and the wine returned to the same casks after each racking. No strange taste could be noticed in the wine.

In fact, the four timbers experimented have communicated no strange taste to the wine stored in them during nine months.

Two of them, the Silky Oak and Cudgerie, can easily be worked, and make good casks. White Beech is absolutely unfit, and Blackbutt seems so difficult to work that it cannot be recommended.

NOTE BY GOVERNMENT BOTANIST.

The timber in question was supplied to Mr. Frere for the purpose of his experiments on my recommendation, and his report is a valuable one, although I am sorry to say the results of his experiments do not bring out our timbers in too favourable a light. But honest opinion, and the results of systematic experiments, is what we require, as much harm has been done in time past by irresponsible over-praise of the properties of our timbers and value of them for specific purposes.

For those who desire further information I would invite consideration of my paper, "Colonial Timber for Wine Casks," in the *Gazette* for June, 1894. See also papers by Mr. J. D. Lankester on timbers for wine casks and vats in the *Australian Vigneron and Fruit-growers' Journal* for July, 1890, and September, 1898.

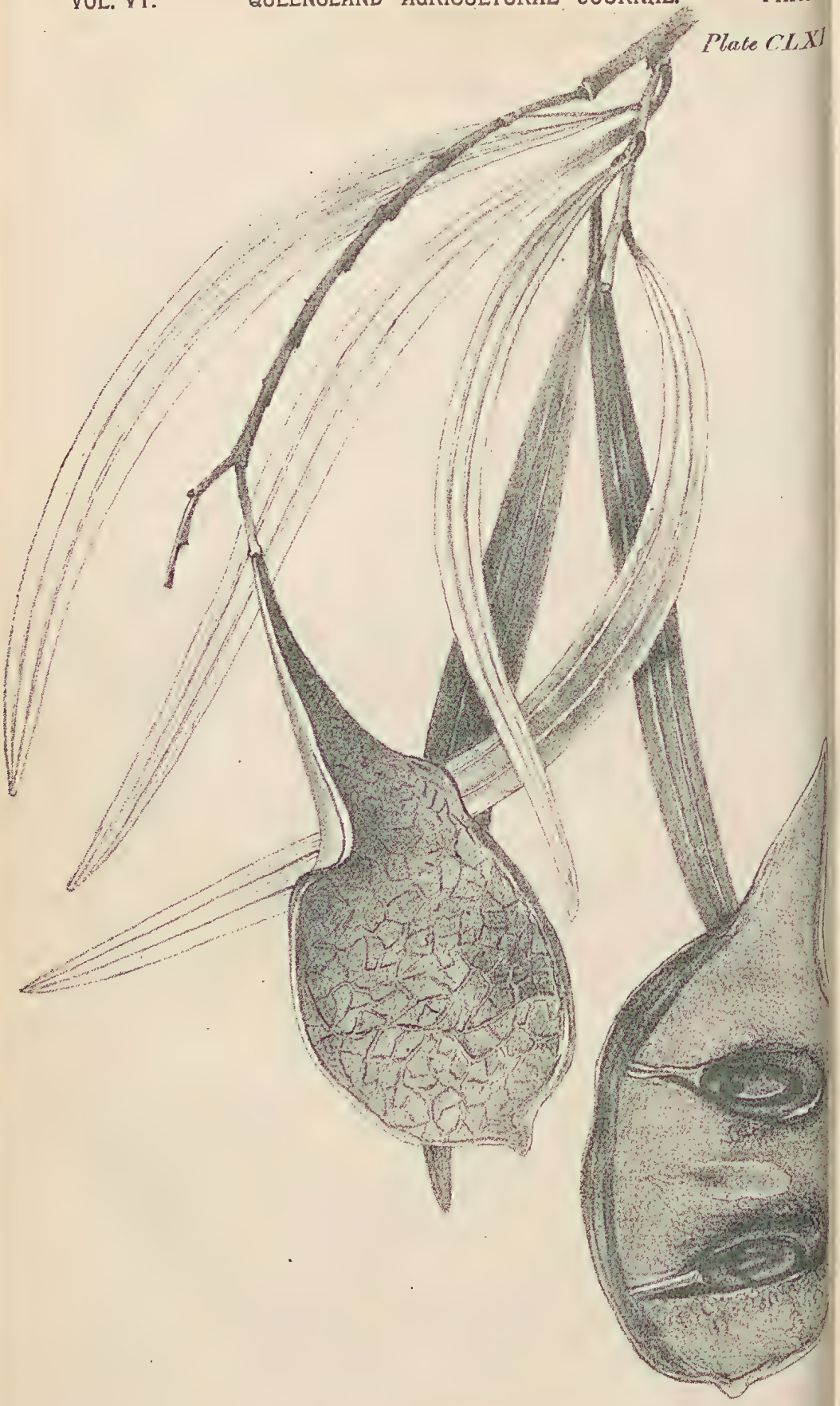
Mr. G. S. Perrin has some "Notes on the Timber Trees of Victoria suitable for Wine Casks" in the Victorian *Journal of Viticulture*, p. 109. Mr. Alward Wyndham writes to the *Sydney Mail* of 15th September, 1894, speaking highly of Native Beech (of which, as will be observed, Mr. Frere speaks less favourably), and also has a note on Rosewood, in regard to which I have some observations in my paper above quoted. Mr. Wyndham's letter is particularly valuable, and is quoted *in extenso*:—

AUSTRALIAN WOODS FOR WINE CASKS.

To the Editor of the Sydney Mail.

SIR,—In Mr. Maiden's paper on this subject, given lately in the *Mail*, he has omitted one native wood—the Beech—which is of high value for the purpose. Beech has been used at Bukkulla vineyard, near Inverell, for about thirty years for large casks and vats with the utmost satisfaction. With precaution in steaming the new casks, it does not impart a taste to wine, nor discolour white wine, and it is perfectly sound for holding. Its only fault is that it will not split into staves, and therefore does not suit for making hogsheads and smaller sizes. There is an abundant supply of it on the Richmond River near navigable water, and it can be got there cheaply—for instance, at Wardell. In this district (the Clarence) there is also abundance, but a good way back. To import European oak is to expend three times the cost for a less suitable wood. The Silky Oak splits excellently into staves. I have found it suit well for 5-gallon wine-kegs, although, from inclining to be porous, the wine oozed out slightly at the ends of the staves the first time of using. Afterwards it takes up, and is perfectly tight. Boiling water put into the new kegs, after remaining in them for some days, was not discoloured at all;

Plate CLXI



ACACIA ROTHII, *Bail.*

but it took a strong taste, which was not overcome till the scalding had been repeated half a dozen times. European oak discolours badly, and gives a stronger taste, necessitating at least as much trouble to get rid of it. I believe some salt added to the water quickens the effect. In my opinion the Silky Oak would answer for casks as large as hogsheads if the staves were made as thick as the stoutest oak rum hogsheads. To this there would be no objection, as they would still be lighter than the rum-casks. Also, the staves should be left long at the chime, and the heads should be made of Beech. It is a beautifully easy-working wood. I have tried Rosewood in the same way, but it is difficult to get the colour and taste out of it. Neither will it split as a rule, I think. Otherwise it is a close, firm, light wood, beautiful to work.

I am, &c.,
Alward Wyndham.

I came across a valuable article by one of our pioneer vignerons, which is well worthy of reference now. It is called "Colonial Casks for Colonial Wines," and is to be found in the *Sydney Magazine of Science and Art* for July, page 28.—J. H. Maiden.

Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

By F. MANSON BAILEY, F.L.S.,
Colonial Botanist.

Order LEGUMINOSÆ.

ACACIA, Willd.

A. Rothii, *Bail.* (n. sp.) Aboriginal name (Batavia River), "Lar." Branchlets slender, compressed. Phyllodia membranous, linear-lanceolate, 6 to 7 in. long, 6 to 8 lines broad near the centre, slightly falcate, with 2 or 3 principal nerves more or less confluent at the base, petiole portion short, very glandular-angular, with a small sunk oval gland on margin of the lamina quite at the base, apex usually obtuse and glandular-apiculate. Judging from a pod attached to one of the specimens received, the flowers are borne in globose heads on somewhat short peduncles, or perhaps sometimes forming few-branched panicles. Pod flat, woody, about 4 in. long and over 1½ in. broad in the upper oblong half, thence somewhat abruptly tapering to an acute, straight, or curved base; sutures bordered with a narrow edge, the valves prominently transversely veined outside and reticulate almost alveolate inside. Seeds transverse along the centre of the pod and sunk in the substance of the valves, oval-oblong, about 5 lines long; funicle straight, expanding at the top into a cup-shaped arillus enclosing about one-third of the seed.

Hab.: Mouth of the Batavia River, *Dr. W. E. Roth.* The position of the present species seems between *A. latescens*, Benth, and *A. sericata*, A. Cunn.

POISONOUS WEEDS IN THE SPRINGSURE DISTRICT.

ASSISTANT BOTANIST'S REPORT.

The following is a copy of a report which has been submitted to the Minister for Agriculture (Hon. J. V. Chataway) by Mr. J. F. Bailey, Assistant Government Botanist, with reference to poisonous plants in the Springsure district:—

I have the honour to submit the following report of my visit to the Springsure district for the purpose of examining the stock route from Springsure towards Bauhinia Downs, along which stock had died, as was supposed, from

browsing upon poisonous plants. Soon after leaving Springsure, the roa crosses a plain four miles long, on which the grass and herbage, with th exception of *Pimelea hæmatostachya*, or Native Poppy, as it is called locally, ha been eaten out by the large mobs of cattle and sheep which have passed durin the last four months. The number of the latter was something like 300,00 since July last.

After this, scrubby, rising country, timbered with ironbark, scented gum &c., is entered upon, and continues to top of range, 11 miles from Springsure Along here and for some five miles further the Zamia (*Macrozamia Moorei* grows abundantly, and we found it very much eaten down, and in the case o young plants the crowns completely devoured. One can hardly imagine cattl eating the foliage of such a plant, but you will see by the accompanyin specimens that they do so. (*Vide* Plate CLXII.)

Descending the range, the part called the "Staircase" is reached. At th foot we found a lot of Redhead (*Asclepias curassavica*) growing, which appeare to have been browsed upon; also young plants of the Fever-bark (*Alstoni mollis*), which is known by some as Peach-leaved Poison-bush. *Trema aspera* which also grows in the gullies about Springsure, is the plant commonly known by this name.

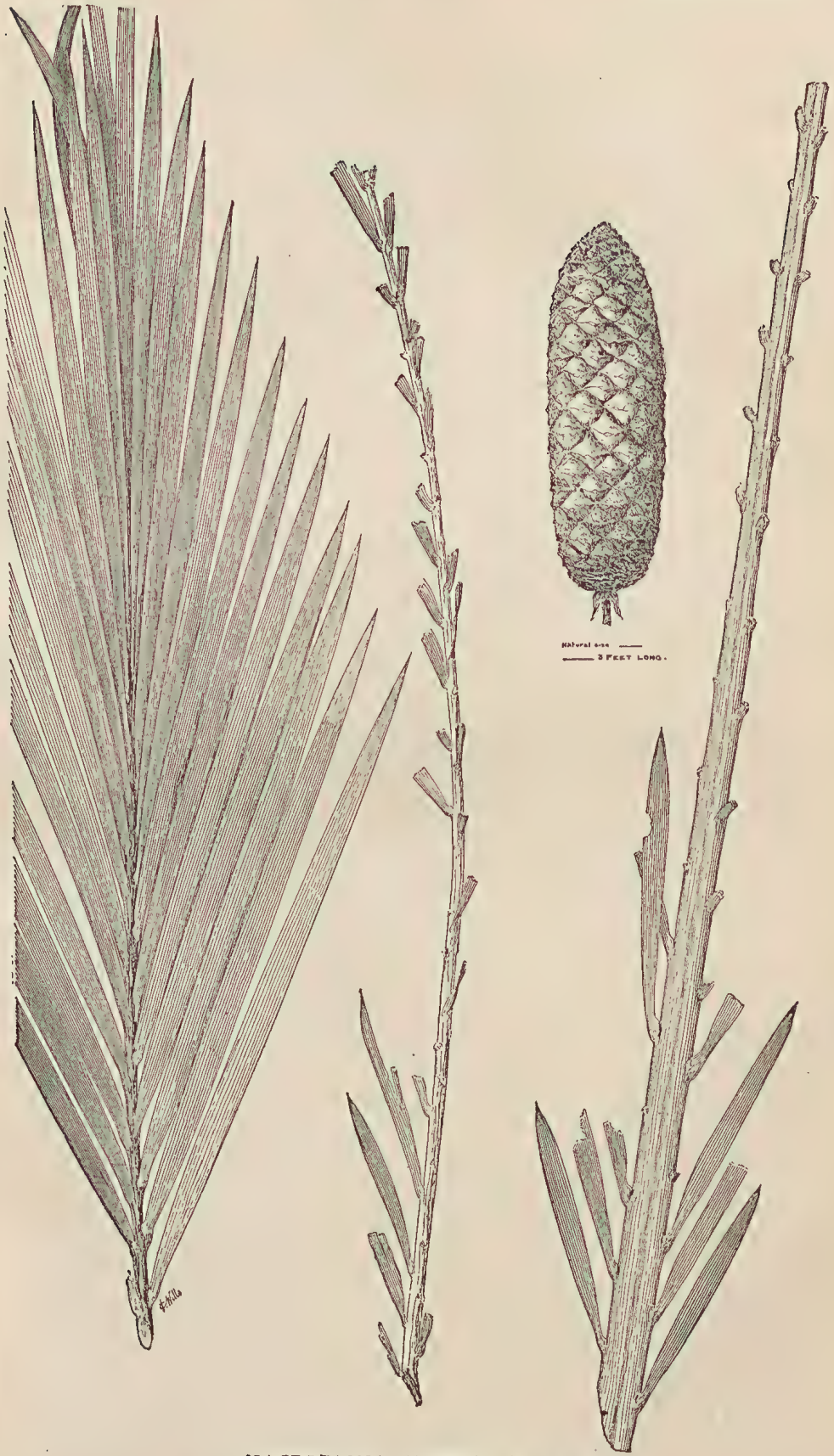
From the Staircase to Orion Creek (11 miles) is scrubby ironbark and wattle country, with undergrowth, principally young Sandalwood (*Eremophila Mitchelli*), with patches of Turkey-bush and *Carissa ovata*, but bare of smal herbage. I did not notice that the last-mentioned plant, which is thorny, and according to Dr. T. L. Bancroft, possesses a poisonous principle, had been browsed upon. At Orion Creek I noticed a few plants of *Datura Leichhardtii* (Native Thorn Apple). For three miles after Orion Creek is passed, the country is furnished with good grass and an abundance of the *Pimelea*, which, however, grows on all good black soil between Springsure and Rolleston Meteor Downs is then entered, and is thinly timbered for eight miles with open patches of downs. The only suspicious plant observed was the previously mentioned *Carissa*, but this did not show signs of having been fed on.

The road then runs through Albinia Downs, which is lightly timbered with stunted bloodwood, &c., for eight miles, or to within six miles of Rolleston, when a large grass plain about four miles in extent is met with. Here, which is within a mile of Albinia Creek, a large quantity of Turkey-bush (*Myoporum deserti*), with Native Fuchsia (*Eremophila maculata*), is growing on the right-hand side of road. This runs from Meteor Creek (about one and a-half mile), but, until above locality is reached, it is away to the right of where the stock travel. On this plain the *Pimelea* is again abundant, and we noticed, for the first time, that the leaves had been eaten by sheep. This plant, according to Bailey and Gordon, in "Plants Reputed Poisonous to Stock," is considered by many as one of our worst poisonous herbs, and is credited with killing hundreds of sheep. It is, however, stated that if the ears of a sheep poisoned by this herb are slit before the poison has taken much effect upon the animal its life may be saved. On Albinia Downs we noticed plants of the Prickly Lettuce (*Lactuca scariola*), a naturalised species which exudes a milky, narcotic juice, and was at one time suspected of poisoning cows at Rosewood. I pointed out this plant, and recommended its destruction before it spreads any further.

After Albinia Downs is left, swampy land, with tea-tree, coolibar, and a little undergrowth of lignum, prevails, until Rolleston is reached.

At Albinia Creek, about six miles from Rolleston, I was shown a spot where thirty-five out of a mob of bullocks had died, and was informed other deaths had occurred until past Rolleston. This would be about five days' journey (with cattle) from where we had noticed the Zamia so much eaten; and as we could not find that cattle had eaten the other plants mentioned to any extent, I came to the conclusion that it (the Zamia) had been the cause, and, from inquiries subsequently made, I have no doubt that such was the case.

Plate CLXII.



MACROZAMIA MOOREI, *F. v. M.*

Showing Parts of Two Leaves Browsed on by Cattle. (One-half Natural Size.)

Plate CLXIII.

EREMOPHILA MACULATA, *F. v. M.*

Plate CLXIV.

MYOPORUM DESERTI, *A. Cunn.*

Mr. E. Lord, stock inspector of the district, informed me that he had instructed the constable at Rolleston to make *post-mortem* examinations of the cattle, with the result that quantities of undigested Zamia were found forming a mat within the "bible," thereby blocking all subsequently eaten food.

Symptoms.—The animal is apparently quite well in the morning, but about midday the ears begins to droop, and a tarry-like substance is passed. The beast then begins to stagger about, and rushes madly at any object in front of it.

Mr. J. Archibald, a very old resident of Rolleston, who is considered to be well informed on all stock matters, told me that he had seen a number of these beasts opened, and in most cases had observed the Zamia matted as above stated; also that he had seen bullocks feeding upon the plants about Springsure. He had also found the Peach-leaved Poison-bush in the stomachs. As the leaflets of the Zamia have extremely sharp points, no doubt these would have a tendency to inflame the stomach, independent of the poisonous principle it is said to contain.

From Rolleston to Racecourse Creek, a distance of 10 miles, the country is composed of scrubby ridges, with bauhinia, sandalwood, bloodwood, ironbark, &c., but the route, from previously mentioned cause, is destitute of small herbage, with the exception of the *Pimelea* and a little *Cassia sophera*. About five miles past Rolleston, just after entering Planet Downs, Turkey-bush (*Myoporum deserti*) is met with, and continues more or less to Racecourse Creek, where it grows very thickly. Here also a large quantity of the Native Fuchsia (*Eremophila maculata*) was growing, and showed signs of having been freely browsed upon. It was in both flower and fruit. The Turkey-bush, which was in full fruit, had also been eaten, but not to the same extent as the fuchsia.

About three months ago, a drover, who had allowed his sheep to feed for half-a-day here, began losing them soon after leaving, and deaths continued to occur until Taroom was reached.

The drover reported that, before death, the head became so swollen that he thought at first they were suffering from catarrh.

At the time of our visit, this creek was dried up, and we noticed about 80 dead sheep, which had died about three weeks previously; and we were informed that the drover of these had also allowed them to feed here for half-a-day.

Mr. Lord informed me that at this locality, soon after rain, the Darling Pea or Indigo (*Swainsona galegifolia*) comes up very thickly; and on both above-mentioned occasions rain had just fallen.

I therefore am of opinion that the Native Fuchsia (Plate CLXIII.), in conjunction with the Turkey-bush, and probably the Darling Pea, is in a great measure responsible for the losses.

The Native Fuchsia has for many years been looked upon as poisonous, specially when in young fruit.

Mr. Jacob Low, in Bailey and Gordon's work, states that four of the fruit are sufficient to kill a sheep, and that the effects are worse after rain. The so-called Turkey-bush (*Myoporum deserti*) (Plate CLXIV.) is also reported in the same work as dangerous to travelling sheep, but, although plentiful in many parts along the route, Racecourse Creek was the only place where we found it eaten to any extent.

The dire effect of the Darling Pea or Indigo on stock has long been known.

From Racecourse Creek to Planet Creek, four miles of open sandy forest country, with Moreton Bay ash, bloodwood, cypress pine, bauhinia, poplar-box, sandalwood, beefwood, &c., was passed through, which was barren of herbage, with the exception of Bathurst burr, which, however, was seen all along the road. This is succeeded by sandy flats for three miles, again bare of herbage, and then four miles of stony ridges until the Planet Downs head station is reached. Somewhat similar sandy and ridgy country continues to foot of Expedition Range, which is about 12 miles distant.

Mr. E. Lord, stock inspector, who is doing all in his power for the safe of stock passing through his district, has for some time had notices Springsure and Rolleston, warning drovers of the most dangerous spots alo the route, and, as the result of my visit, will be able to augment these wi others.

As showing the value of the notices by Mr. Lord, I might mention th I met a couple of drovers in charge of sheep travelling through Planet Dow and in reply to my inquiry whether they had met with any losses they repli in the negative, adding that they had observed the notices and thus avoided localities reported.

In conclusion, I may recapitulate the suspected plants mentioned herein: *Macrozamia Moorei*, the Zamia of the district; *Asclepias curassavica*, Re head; *Datura Leichhardtii*, Native Thorn Apple; *Carissa ovata; Lactu scariola*, Prickly Lettuce; *Cassia sophera; Swainsona galegifolia*, Darling P or Indigo; *Eremophila maculata*, Native Fuchsia; *Myoporum acuminatum Myoporum deserti*, Turkey-bush.

Apiculture.

BEES AND FRUIT-TREE BLOSSOMS.

SOME orchardists are still under the impression that bees are injurious to fru trees, and especially to the orange-tree, believing that in seeking for honey th insects eat away the heart of the blossom. On this subject we printed a ver conclusive paper by Mr. Henry Tryon, Entomologist, in this *Journal* (Vol. II p. 29), to which we refer any of our readers who still have doubts. Mr. Tryo sums up his deductions by saying: "Wherefore it may be concluded . . that bees, in so far as they frequent orange blossoms, are beneficial to th orchardist rather than prejudicial to his interests."

In further confirmation of Mr. Tryon's statement, we find in an old numbe of *Martin's Home and Farm* the following, under the heading of "Bees for th Garden and Orchard":—The advantage of bees to every horticulturist an fruitgrower will do more than compensate for the outlay and trouble attendin them, even if they yielded no other revenue. This was demonstrated recentl in a district where bees were so scarce that only two colonies could be found i an entire district. A scarcity of fruit was the consequence, although trees wer sufficiently numerous. In California, fruitgrowers are planting the black sag close to their orchards to induce bees to visit them.

GRANULATION.

To keep extracted honey from granulating, or to reduce it to a liquid stat after granulation, set the vessel containing it in a pot of boiling water unti thoroughly heated. Adulterated honey will not granulate. Some pure hone will not granulate. Granulation is considered a certain indication of purity.

AN APICULTURIST'S DIARY.

MR. W. F. LYON, of the Oxley Apiary, who has made a special study of th times of flowering of various *Eucalypts* much frequented by bees, sends us a copy of his diary for three years in so far as it relates to bees and wild flowers

He carefully watched the flowering of the trees in the bush, and found that they did not flower in every district at the same period of the year. In some cases, within a radius of 25 miles, there would often be a difference of two months in the flowering season of the same kind of tree, and, also, that many trees which would bloom in the Oxley district during one season would not flower at all in others, and *vice versâ*. The diary which we refer to will doubtless be of interest and value to other apiarists.

Commencing with the year 1889, when Mr. Lyon commenced his observations, we find the times of flowering or of disappearance of efflorescence are taken on the 28th of each month, as follows :—

1889.

28th August.—Blue gums are in full bloom, grey ironbark just commencing to flower.

28th September.—Grey ironbark all out in full bloom.

28th October.—The grey ironbark still in full bloom.

28th November.—Grey ironbark finished flowering; mahogany (apple-tree) and grey gum beginning to flower.

28th December.—A few mahogany in flower. Bees doing very little in honey-gathering.

1890.

28th January.—No flowers out this month. Bees at a standstill.

28th February.—Bloodwood in flower. Bees swarming very much.

28th March.—No flowers out this month. Very wet weather. Bees hard at work robbing.

28th April.—No flowers.

28th May.—No flowers.

28th June.—Spotted gum in flower. Bees bringing a little honey.

28th July.—Tan bark wattle flowering. Bees very low and swarming out for want of food.

28th August.—No flowers this month. Bees very low.

28th September.—No flowers. Bees very low. Thirty hives died out.*

28th October.—Mahogany and grey gum flowering. Bees commencing to work and becoming stronger.

28th November.—Mahogany, grey gum, spotted gum, cabbage gum,† and red ironbark are all out in flower this month.

28th December.—Grey gum, red ironbark in full bloom. Bees have got back to their old standard.

1891.

28th January.—Grey gums nearly done; red ironbark in full bloom, also the cabbage or rusty gum; spotted gum commencing to flower.

28th February.—Red ironbark, bloom nearly done; spotted gum and apple-tree in full bloom; bloodwood commencing to flower.

28th March.—Bloom of spotted gum and apple-tree nearly gone; bloodwood in full bloom.

28th April.—Bloodwood nearly done; blue gum commencing to flower.

28th May.—Blue gum in full bloom.

28th June.—Blue gum and grey ironbark in flower.

28th July.—Blue gum still in full bloom; grey ironbark and tan wattle in flower. Bees doing very well.

28th August.—Blue gum flowers nearly done; also grey ironbark; tan wattle in full bloom.

28th September.—Grey ironbark nearly done. Bees swarming.

28th October.—A few grey ironbark in flower. No honey coming in.

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* The bees in their hives might have been fed until the natural trees and flowers bloomed again. The European winter is more severe on bees than an Australian drought, yet their owners are careful not to let them starve.—Ed. *Q.A.J.*

† The so-called cabbage gum is not a gum at all. Although the Government Botanist, Mr. F. M. Bailey, calls it the "rusty gum," it is the *Angophora lanceolata*, the native name of which is "Toolookar."—Ed. *Q.A.J.*

28th November.—Grey gum and stringy bark out in flower.

28th December.—Grey gum blossoming nearly over. Mountain box* flower this month.

1892.

28th January.—A few spotted gums are out in flower; bloodwood a red ironbark commencing.

28th February.—Bloodwood in full bloom. Bees very strong, but n swarming.

28th March.—Bloodwood nearly done. No other trees in flower.

28th April.—A few bloodwoods yet in flower. Bees at a standstill.

28th May.—No flowers out this month. Bees finished for the winter.

28th June.—Tan bark wattle in flower. Bees very low.

* The mountain box here mentioned is called by Mr. F. M. Bailey the Brisbane B (*Tristania conferta*). It has a broad leaf. The native name is "Tubbil-pulla."—Ed. *Q.A.J.*

Tropical Industries.

THE FUTURE OF THE TOBACCO INDUSTRY IN QUEENSLAND

By R. S. NEVILL,
Tobacco Expert.

THE future of the tobacco industry of Queensland is one that concerns th farmers very much, and presents a problem that they alone can solve. So far the production of the heavier styles of tobacco, within the districts known to produce the most desirable sorts, has about kept pace with the demand; and while these tobaccos are recognised as superior to similar tobaccos grown elsewhere in the colony, yet they are not of that excellent character that these districts can produce if properly handled and cured. As the time, in all probability, will soon come when a larger demand can be secured for our product, I wish to again urge upon the growers the necessity for producing a superior quality, that they may be prepared to offer inducements to buyers from other colonies when Federation is accomplished. Then will be the time when each crop will be purchased upon its merits, and those growers having the best crops will be able to command the best prices.

That growers may know that the trade of all Australia is worth having and worth striving after, the following figures will show. The figures are for the year 1898. The consumption, exclusive of cigars, of all classes of tobacco in Australia was about 10,000,000 lb. :—

	Lb.
Manufactured tobacco, imported	5,500,000
Unmanufactured ,, ,, ...	2,300,000
Colonial grown ,, ...	2,200,000

While the people of Queensland are as large consumers as the people of the other colonies, the proportion consumed of home grown to the imported article has been largely in excess of any of the other colonies, as shown by these figures :—

	Lb.		Lb.
Victoria consumed of imported ...	2,612,070	home grown ...	382,923
New South Wales consumed of imported	2,774,984	home grown ...	1,224,919
Queensland consumed of imported ...	682,372	home grown ...	578,707

We cannot depend altogether upon our natural advantages to secure a share of this business, but these must be supplemented by intelligent and painstaking methods. We must create a larger demand by producing a superior article; this is simply the common sense that governs all practical business.

In the several articles I have heretofore written for this *Journal*, I have endeavoured to show how the best results are to be obtained, but it is difficult to impress these facts upon growers so long as a fixed price is paid for the whole crop of a given district. This will be changed when buyers from the other colonies seek to purchase in this colony. Supplemental to what has been heretofore published, it is necessary to impress upon the growers that the value of their product is much enhanced by a good variety of seed.

It is true that, so far as the quality of the tobacco is concerned, it is controlled by soil and climatic conditions, but there are certain qualities, peculiar to certain varieties not affected by these conditions, that make them more valuable, such as the structure of the leaf—that will give a larger yield when the stem is taken out, its shape making it desirable for use as wrapper with a minimum of waste; the smallness and position of the fibres, that give a smooth and finished look to the manufactured product; also its curing qualities, yielding readily to proper treatment and giving exact results. These are constitutional peculiarities that do not readily disappear; at the same time, they otherwise partake of the general character of the tobaccos grown in a given place. Therefore it is important that good reliable seeds of a desirable variety should be secured.

For the information of the growers, I will say there is no distinct type of tobacco known as Kentucky or Virginia, and to so label seed is misleading. While these two States are the largest producers in the United States, and grow many varieties common to both, none of these varieties bear distinctively their name.

In the selection of seeds for heavy tobacco you cannot go far wrong in the Pryors. It is from these, sometimes cross-bred for special purposes, that we get our most desirable varieties.

The Burley tobacco is a sport, and very valuable for certain work, both in the United States and in Great Britain, but has no market in the colonies.

Our tobacco-growers could much improve their curing-sheds by siding them up, and at a small cost. It should be borne in mind that drying is not curing; and when the tobacco is hung in the shed, the work should not be considered finished until stripping time comes.

To secure the best results, the curing-shed should be as free as possible from sudden changes, but conditions should be kept as uniform as possible during the whole curing process, and it is for this reason largely that artificial processes are used. The tobacco should be hung uniformly throughout the shed, and not too thick, that each stalk may be subject, as nearly as possible, to the same conditions, and this is necessary to get uniform results. It is also necessary, if good results are to continue, that care should be taken of the lands suitable for tobacco, and not to exhaust them by continual cropping. Two or even three crops may be safely taken from perfectly fresh lands, but beyond that may do serious injury, unless some method is adopted to keep up the supply of potash. This can be done, to some extent, by scattering the tobacco stalks over the field as soon as the tobacco has been stripped and ploughed in. I am of the opinion that lands that have been too heavily cropped with tobacco may be restored by sowing to lucerne and grazing it off, and then sown to wheat, the latter being allowed to mature.

Usually, when the cropping has not been too heavy, one or two years in wheat greatly freshens it. The practice in the United States, when fertilisers are not used, and the soil is suitable for general cropping, for old ground a three-years' rest is allowed, after one year in tobacco; and of these three years it is thought to be well to let tobacco be succeeded and preceded by wheat. This is practised by many of our good growers.

Of cigar tobaccos, under Federation, we should have a monopoly, and growing of such should be one of our most profitable industries.

We have the climate and soil in North Queensland that is common to best cigar-growing countries of the world. The cigar-manufacturing indus is not large in this colony because it is handicapped by an excessive excise, also because there is very little strictly cigar tobacco grown; but we can some extent overcome the former when we get a plentiful supply of desira tobacco. North Queensland can grow cigar-wrappers of superior quality, when the doors of the sister colonies are open to us they will offer a mar for all that we can grow for several years to come, as their cigar-manufactur interests are large, and they import practically all of their stocks. farmers who are within the proper districts for growing these tobac and are disposed to do so, are fortunate, in view of the fact th good cigar-wrappers always fetch a good price, and the question of of production is not so serious a one. They have the world for a market, the tobacco will stand the expense of shipping. I would especially recomm to the small farmers of our Northern country to grow two or three acres of t tobacco every year. This can be done without seriously hindering the oth work of the farm, and will be so much extra money that they would otherwise have.

COFFEE IN PORTO RICO.

AMERICA'S new possession, Porto Rico, produced, in 1898, 260,000 bags, or, s 33,800,000 lb. The total coffee crop of the world last year amounted to 806,6 tons, of which the United States consumed, say, 322,660 tons. It will th appear (observes the *American Grocer*) that the total production of our ne coffee-growing State—Porto Rico—being only about $\frac{1}{2}$% of 1 per cent. of co consumption, will not seriously disturb our markets this year.

FLORIDA-GROWN TOBACCO.

THE *Southern Tobacco Journal*, of Winston, N.C., says:—

Some wonderful things are being accomplished in Florida in tobacco raising. One of these is the production of plants of such gigantic size that stranger from Connecticut might well imagine, on arriving at one of th plantations, that he was in Brobdignag.

Conceive, if you can, of fields of "Sumatra Wrappers" in which the plant tower far above the head of a man on horseback.

It was noticed some time ago that plants which happened to be in the shad of trees attained a superior development.

The suggestion was taken up by a New York company in Gadsden county Fla., which built an arbour of laths 9 feet high and covering 1 acre. Beneat this, Sumatra tobacco was planted, and the result was astonishing. Expert declared that the island of Sumatra had never yielded a finer type of wrapper leaf. Here was a great discovery. Florida planters are now growing many hundreds of acres of tobacco under arbours.

The pretty part of this business is this wrapper sells easily at from 2·50 dollars to 3 dollars per lb.

Science.

ANALYSIS OF RICE BRAN.

By C. A. T. FURSDON, Lyndhurst Dairy, Kingston.

In answer to a Northern correspondent *re* rice bran as a food for stock, we are enabled to give an analysis of the bran, which we extract from the *Jamaica Agricultural Journal* :—

ANALYSIS OF A SAMPLE OF JAMAICA RICE BRAN.

Moisture	10·54
Oil	4·33
*Albuminous bodies	8·91
Carbohydrates, &c.	43·09
Woody fibre	20·50
†Ash...	12·63
	100·00

This would form excellent ration for stock but for the large proportion of woody fibre, which is entirely indigestible. The proportion of protein (nitrogen) is fair, somewhat less than cornmeal, but only half what wheat bran contains. The fat or oil exists in better proportion to the protein and carbohydrates for our conditions than in corn or cornmeal. Still, unless this rice bran could be sold at one-fourth the price of wheat bran, it could not in any way supersede it on account of the proportion of the indigestible fibre which is an objection to its constant use as a single ration. If mixed to the extent of one-third with some strong condensed food such as cotton-seed meal, and the bloodmeal used for poultry or beanmeal, it might form a cheap and suitable ration for cattle, pigs, or poultry.

* Contains nitrogen. † Including silica.

Forestry.

SOME TIMBER TREES OF QUEENSLAND.

By J. W. FAWCETT,
Member of the English Arboricultural Society.

THE BASTARD BOX (*TRISTANIA CONFERTA*, R. Br.)

Botanical Description.—The Bastard Box is a fine handsome tree, with large spreading head and dense foilage. The average height is from 80 to 100 feet, with a diameter of from 3 to 4 feet. In some districts it attains a much larger size, and specimens are often found measuring as much as 150 feet in height with diameters in proportion.

Bark.—The bark is smooth and of a brownish colour, persistent at the base of the trunk, but deciduous on the upper part and branches.

Leaves.—The leaves are alternate, ovate lanceolate in shape, from 3 to 6 inches in length, and crowded at the ends of the branches.

Flowers.—The flowers are small but showy, of a yellowish-white colour and are arranged in cymes. They are in blossom from November to January.

Fruit.—The fruit is a hemispherical, or cup-shaped, capsule, about ¼-inch in diameter.

VERNACULAR AND BOTANICAL NAMES.—The Bastard Box is also known as Brush Box (from its being found in brushes or scrubby patches), Brisbane Box (from being found in the vicinity of Brisbane), Red Box, and White Box, and also as Bastard Mahogany. The specific name, *conferta*, was given to this species by the celebrated British botanist, Dr. Robert Brown, in allusion to the crowded leaves at the ends of the branchlets.

DISTRIBUTION.—The Bastard Box is found growing in open forest ground and on ranges and higher lands in the coastal districts of Queensland both north and south. It is also found in the northern districts of New South Wales.

USE.—The Bastard Box yields a good, useful, dark-grey-coloured timber. It is very hard and tough, very strong and durable, closely grained and valuable. Timber from small trees shrinks and warps very much in drying, but that from large trees shrinks and warps but very little. Though it is plentiful enough, this timber is but very little used. One of its most important points and the chief characteristic feature of the timber, is that it is almost absolutely impervious to white ants or termites. This property ought not to be lost sight of, and in those districts where these insects are very bad this timber should be used for railway sleepers. It is much used for joists, and for various kinds of wheelwrights' work. It is also used for knees and ribs of vessels, and it has been known to preserve its soundness when employed in the latter capacity for a period of over 30 years.

Besides producing a select and lasting timber, the Bastard Box makes a noble shade tree, and it deserves to find a place in the list of our indigenous ornamental and shade trees.

THE WATER GUM (*TRISTANIA LAURINA*, R. Br.)

BOTANICAL DESCRIPTION.—The Water Gum is a tree of variable appearances. It is usually a moderate-sized tree, attaining a height of from 60 to 80 feet, with a diameter of from 18 to 30 inches. In exposed localities it is frequently small, of crooked growth, and for the most part shrubby, but in favourable localities, and especially moist situations, it attains a very large size, reaching to a height of as much as 120 feet, with a diameter in proportion.

Bark.—The bark is smooth, slightly fibrous, somewhat persistent, and often of a reddish colour.

Leaves.—The leaves are alternate, lanceolate, or long and narrow, from 2 to 4 inches in length, and of a dark or deep green colour.

Flowers.—The flowers are yellow, in short axillary cymes, and appear in blossom from December to February.

Fruit.—The fruit is an obovoid or almost globular capsule, from ¼ to ½ inch in diameter.

VERNACULAR AND BOTANICAL NAMES.—The Water Gum, so called from its general habitat, is also known as the Swamp Mahogany and Beech, names which are very misleading, and also the Laurel-leaved Water Gum, from its laurel-like leaves. The specific name, *laurina*, was given to this species by Dr. R. Brown from the resemblance of its leaves to those of the laurel.

DISTRIBUTION.—The Water Gum is found in open forests, and on the borders of rivers and streams, and lagoons and marshes, in the coastal districts of Southern Queensland, and also in similar localities in New South Wales and in Gippsland, Victoria.

USE.—The Water Gum yields a strong, very tough, closely grained, dark-coloured timber, useful for tool handles and the knees and ribs of boats. It is also said to be one of the best for cogs of wheels in machinery. It is also a suitable timber for paving blocks.

THE LEMON-SCENTED MYRTLE (*BACKHOUSIA CITRIODORA*, Foth.)

Botanical Description.—The Lemon-scented Myrtle is a medium-sized tree, with the young shoots slightly hoary, growing generally to a height of from 20 to 30 feet, with a diameter of from 6 to 12 inches. In fertile localities, however, it reaches to a much greater size, often attaining a height of from 50 to 60 and even 80 feet, with a diameter in proportion.

Leaves.—The leaves are ovate lanceolate, from 3 to 5 inches in length, with the undersides hoary, and having a verbena-like fragrance.

Flowers.—The flowers are small and numerous in umbel-like clusters.

Fruit.—The fruit is a capsule.

Vernacular and Scientific Names.—The Lemon-scented Myrtle is so called from the lemon-like fragrance of its foliage. It is also known as the Satinwood, from its timber. The generic name, *Backhousia*, was applied to it by the British Botanists, Sir W. J. Hooker and W. H. Harvey, after James Backhouse, a Quaker missionary, who with G. W. Walker visited the Australian colonies in 1834-1836. The specific name, *citriodora*, was given to it by Baron Müeller from the fragrance of the foliage having a close resemblance to that of the Sweet Verbena (*Lippia citriodora*, Kunth.)

Distribution.—The Lemon-scented Myrtle is found in scrubs in South Queensland, especially on the Maroochy and Pine Rivers, and also near Howard. Some of the finest and largest trees are found in the neighbourhood of Eumundi.

Use.—The Lemon-scented Myrtle yields a hard, close-grained, pinkish timber, useful for several purposes.

The foliage is very rich in essential oil, having a lemon-like fragrance, and is largely used in the manufacture of one of our most valuable essential oils.

This tree is well worth cultivating for the fragrance of its foliage.

TREE-PLANTING IN SOUTH AUSTRALIA.

The following paper was read at the Eleventh Congress of the Agricultural Bureau of South Australia by Mr. A. F. Noll (Quorn). The paper was entitled "Tree-planting in the Far North." We gladly publish suitable papers and articles on Australian forestry, convinced as we are of the very great importance attaching to the conservation of the forests of Queensland. When we have arrived at the point of realising what time is required for the production of even the quickest growing of our timber trees, then we shall, it is to be hoped, also realise the importance of such legislation as shall tend to the perpetuation of our timber supplies. That the Queensland Government is alive to the urgent need for action in this direction is evidenced by the fact that provision is made on the present Estimates for an Inspector of Forests, which we take to mean is merely a prelude to the formation of a Forestry Department which will take under its protection the still extensive forests of the colony.

Mr. Noll says:—"This is a most important subject, and one which has been before the public very frequently of late, and all the advantages accruing therefrom were plainly pointed out, from its influence on the climate, its usefulness for shade and shelter for stock, the necessity of producing timber and firewood. to its beautifying the barren country. I will not attempt to introduce anything new, but my object is to encourage forest tree-planting in the far northern districts, where it is generally said that it is no use, as they will not grow. My own experience shows that such is not the case, as I have nearly 2,000 trees growing in an avenue of three rows along the road adjoining the park lands south of the town of Quorn, over a mile long, and in places on both sides of the road. The trees are of various ages, from seven years down to one year old,

and therefore also of various heights, from 20 feet downwards. The last five years have been very dry, and the growth of the trees has been greatly checked. To those who have been unsuccessful in the past I would say, 'Try again.' There is scarcely any farm where a suitable spot could not be found to grow some trees successfully; low-lying ground, where the moisture will drain to, should be selected if possible. In our dry areas the ground should be well ploughed—6 inches deep will do, but if deeper so much better—and the ground well pulverised. Plant the young trees carefully, and take care of them the first year; if the soil gets too dry, a watering should be given, and the soil loosened around them, and kept free from weeds. If the young trees are assisted through the first summer, they will generally hold their own afterwards, provided that they are kept free from weeds and securely fenced against stock. I would advise intending planters to raise their own trees, as this can be done with very little trouble. The trees are then on the spot when wanted, are not damaged through carriage and exposure to the air, and can be planted when it is convenient and the weather is suitable. There is no doubt that the Sugar Gum is the best tree to plant for timber in the north; it is hardy, and a fairly free grower if the conditions are suitable. Where trees are required for shade, I would recommend the Pepper-tree. Seeds of both should be sown in boxes or pots in nice sandy soil in January or February; the seeds should only be lightly covered with fine sand, and kept moist till the plants are up, and regularly watered afterwards. If the plants come up too thick they should be thinned out; if in pots, it is best to leave only one, the strongest, pulling out all the others. The young plants should not be sheltered too much, or they will be too tender and will suffer from frost when planted out. I would not advise planting too early; the end of July and August is early enough, as there is then less danger of frosts."

The late Baron Ferd. von Mueller, K.C.M.G., late Government Botanist for the colony of Victoria, says of the Sugar Gum, which he calls Sugary Eucalypt (*Eucalyptus corynocalyx*), that it ranges along Spencer's Gulf in many places; thence is dispersed westward as far as Streaky Bay (Colonel Warburton); on the stony declivities of Mount Remarkable and at Wirrabara, ascending to considerable elevations (J. Ednie Brown); about the lower Wimmera (J. Allen), and probably to be found yet in many adjacent localities. This tree is not found in Queensland (says Mr. F. M. Bailey, Government Botanist), but there is no reason why it should not be successfully grown in our Northern districts. According to the Inspector-General of South Australian Forests, it reaches a height of 120 feet, the trunk attaining a final diameter of 5 or even 6 feet at about 5 feet from the ground; length of bole for timber up to 60 feet. The wood has come into use for fence posts and railway sleepers; its durability is attested by the fact that posts fifteen years old showed no signs of decay.

For a desert country, it is one of the most eligible of timber Eucalypts.

FARM FORESTRY.

WHEREVER the planter has chosen his trees with intelligence and so succeeded in producing a useful plantation, there has been the real spirit of forestry.

In the spruce lands of the north-east, for example, many lumbermen have come to see that by leaving the small trees standing they can return for a second crop earlier than would otherwise be possible, and that this plan pays. In many cases they are leaving the spruce, which measures less than 10 inches in diameter, and in others that which measures less than 12 inches, because the trees under these sizes can be harvested with greater profit if they are left a few years to gain a larger growth. Similar work has been done in other sections of the United States, as, for instance, in the southern pine belt, where repeated crops of long leaf pine have been cut from the same tract.

By far the greater amount of such work has, however, been done by farmers and other owners of small tracts of woodland. Very many farmers have made a practice of thinning their wood lots with care, first removing the dead, dying, or unpromising trees, and then letting the remainder stand in order to utilise the growth of the trees, and to obtain continually from the wood lot firewood and other material for the farm, and occasionally a crop of larger trees for the market. Other farmers, again, devote a number of acres to the production of hardwood sprouts for fuel. They cut over the land every 25 or 30 years, and calculate that from one-half to one cord of wood is produced annually by this system of forestry.

Tree-planting on waste places on the farm is yet another kind of forestry which has been practised. Work of this character is now widespread, and much of it has been accomplished. In New England there are numerous instances of planting white pine on waste places with excellent results, and in Massachusetts the planting of larch has proved highly satisfactory. Many farmers have found it profitable to plant locust and red cedar for fence posts, and in more than one case the cultivation of black walnut has brought larger returns. In the central west the fast-growing catalpa and the ailanthus have produced remarkable results in short periods in the hands of private growers.

A distinct branch of tree-planting is practised in the treeless States of the West. There, in addition to the uses to which their wood is put, trees have proved of great value in the form of windbreaks. In these cases the best results have generally been obtained from the osage orange, catalpa, maple, elm, box elder, Norway spruce, Scotch pine, and others, according to differing local conditions.

There is yet another use to which tree-planting has been put. Along the banks of streams trees have been set to fix the fast eroding soil and to prevent the increasing floods; and on cultivated hillsides which have begun to gully from the washing of rain, trees have been made to do good service in checking the excessive surface drainage and saving the fertile soil.

The protection of woodlands from fire forms one of the most important branches of forestry which has been practised in the United States. Indeed, without such protection any efforts to cut the timber with a view to reproduction or to plant new forests are useless. Various measures to guard against forest fires have been adopted in different localities. For example, in the Atlantic pine belt many forest-owners burn off the upper layer of leaves and needles in the early spring in order to prevent the spread of fire later in the season.

In Michigan, lumbermen have endeavoured to lessen the danger from fire by lopping and burning the brush left after lumbering. The cutting of fire strips along railroads, and even within the forest itself, has been used as a precaution against fires. But a common and very effective way to guard against fire is careful watching. Many large owners of forest land employ a number of men as a fire patrol, and often an extra crew of watchers is hired during the dangerously dry seasons. In the same way many lumber companies which own logging railroads employ a man to follow the trains and put out any fires that may be started.

The foregoing is extracted from a circular by Gifford Pinchot, forester of the United States Department of Agriculture. The year-book of 1899 will consist of a résumé of the achievements of this country in every branch of science relating to agriculture, and will be prepared with a view to its special distribution at the Paris Exposition. The division of forestry will contribute a short history of forestry in the United States, and also an account of the efforts of private landowners to apply the principles of forestry. An impression widely prevails abroad that little or nothing has been done in the United States in the way of forestry. This impression, Mr. Pinchot thinks, the year-book ought to remove, and, in seeking information regarding such forest work as has been described, he earnestly invites correspondence from those who have done any work along the lines of forestry.—*Florida Agriculturist.*

FORESTRY IN GERMANY.

ACCORDING to Gustav Wagener, Counsellor of Forests at Coburg, there are 35,000,000 acres of forests in Germany, of which 11,250,000 acres are owned by the State. Henceforth forests will be planted only for timber, not for firewood. Timber will pay better and better, while the price of firewood sinks more and more in consequence of the low price of coals, which can be transported now cheaply by means of local railways and by water. There is a very large export of timber from Germany to the western countries of Europe that are almost without forests. In advocating a term of 80 years for the cutting of pine forests, he calculates from medium soil a yearly revenue of from 3 per cent. to 5 per cent. on the value of the soil. With beech forests it will be about the same, but oaks will require from 120 to 160 years before they should be felled, and the value of their timber is constantly rising.

THE IMPORTANCE OF FOREST CONSERVATION.

IN all parts of the world the attention of various Governments is daily being drawn to the rapid destruction of forests, and steps are being everywhere taken to put a stop to the wholesale destruction of valuable timber trees, which must inevitably end in an immense shortage of supply in the near future. And not only is legislation being brought to bear on the subject in sparsely timbered countries, but stringent forest laws have lately been enacted in countries where the enormous extent of the forests led to the fond belief that the supplies were practically inexhaustible. Notably is this the case in the United States of America, in South America, in Russia, and Germany. The Australian colonies have taken the alarm, and steps have been taken towards conserving the valuable timbers still standing in the various colonies. Queensland forests are now to receive the attention which has long been urgently called for, and doubtless such judicious forest laws will ere long come into operation which will have the effect of perpetuating our supplies of hard and soft woods, whilst not interfering in any way with the legitimate work of the timber-getter.

The latest advice we have of a movement in this direction comes through the *Board of Trade Journal* from Her Majesty's Agent and Consul-General at Cairo (Egypt) in a report by Sir William Garstin, K.C.M.G., on the Egyptian Soudan, of which the following is an extract :—

"A very possible source of future wealth to the Soudan lies in the vast forests which line the banks of the Upper Blue Nile, and extend, in an easterly direction, to the Abyssinian frontier. In the Bahr-el-Ghazal Province also, particularly in the Bongo country, large forest tracts exist.

"The Ebony-tree (*Dalbergia melanoxylon*) is met with south of Karkauj, on the Blue Nile, and again in the vicinity of the Sobat River. This tree does not, in these latitudes, attain to a very large girth, 9 inches being apparently its maximum diameter. It must, however, be very common in these forests, as most of the principal houses in Omdurman are roofed with it. The value of *Acacia arabica*, from which the white and red gum is obtained, is well known; while the other kinds of acacia, such as *Acacia nilotica* (in Arabic, 'Sant'), are the chief source of the fuel supply.

"A bamboo is met with in the ranges of hills to the south of Famaka, and, according to some, mahogany is found in the forests round Fazogl and in the Beni Shangul country.

"The means of transporting such woods can only be by the river. Unfortunately, neither the ebony nor the acacia will float in water, and, therefore, such transport is debarred in these cases. If a good and serviceable timber tree can be discovered in the Blue Nile forests which can be floated down the river to Egypt, a large source of revenue will undoubtedly have been found. Extensive sawmills might be erected at Assouan, utilising the power available at the dam, now under construction, and an important timber trade might one day arise.

"On the White Nile, in the Bongo and Rohl districts, the India-rubber Creeper (*Landolphia florida*) is found in great profusion. If the rubber yielded by this creeper be not of quite so good a quality as that obtained from the Assam India-rubber Tree (*Ficus elastica*), it is still of sufficient value to be counted as an important asset in the future trade of the Soudan. This plant, which has large laurel-shaped leaves, and a white flower resembling a jasmine, requires several years to mature before yielding rubber in any quantity. The natives obtain what they require by tapping the stem, usually in such a reckless manner that the creeper dies under the operation. The Assam India-rubber Tree should certainly flourish well in most parts of the Soudan, more particularly south of Khartoum. Although this tree takes from 20 to 30 years to arrive at a girth sufficient to permit of regular tapping, its yield is so valuable (about £3 per tree per annum) that its introduction into the country is well worth attempting.

"It is very much to be hoped that a scientific examination of the Soudan forests may ere long be carried out under the superintendence of an expert. An Indian forest officer (from Burma for choice) might be deputed for this purpose. It is certain that much valuable information would be obtained from his report. Such an appointment needs no recommendation—its necessity is obvious A trained forest officer could, moreover, render good service by advising the Government as to the best method of preserving the valuable fuel supply which at present exists on the banks of both rivers. This supply, although apparently inexhaustible, must speedily diminish, unless the cutting and felling of the areas is carried out upon some regular system which will permit of the young trees growing up and replacing those cut down. It is, of course, inevitable at present that the felling should be carried out in a wasteful manner. Fatigue parties are landed from the boats, and are required to cut the largest amount of wood in the shortest possible time. The men have no idea of the value of the trees, and naturally select those which are nearest to the water and easiest cut. Should this practice be continued, it is certain that a few years must see a great diminution in the belt adjacent to the river On the Blue Nile even the valuable gum-producing acacias are being felled for fuel."

THE PRODUCTION OF TALL TREES.

By A. J. BOYD.

Many years ago, whilst travelling in the Far North in the company of a detachment of native police, I had excellent opportunities for studying the forest and scrub-tree growth between Georgetown, Herberton, Cardwell. Riding along a forest ridge, overlooking a deep and rather precipitous gorge, I was struck by the difference in the height of the trees growing at the bottom of the gorge and those growing on the ridges. Looking across the chasm, I saw the heads of a number of pine-trees which towered even over the heads of the trees on the ridges. These splendid trees sprang from the very bottom of the gorge, and a peculiarity about them was that the bole or trunk appeared to be perfectly cylindrical, or of the same diameter below the first branches as it was near the ground. Other trees growing on the sides of the gorge were drawn up in the same manner, but their tops did not reach to a greater height than that of those which had sprung from the lower depth. I have since observed the same drawn-up appearance in other localities where trees are growing in deep gullies. It can be observed anywhere on the Main Range, and on the Blackall Range, and nearer Brisbane at One-tree Hill (Mount Coot-tha.) Now, from this circumstance, a very good lesson in the art of forestry may be learnt. Consider the kauri and hoop pines. The former makes little wood until it has shot up so as to top the scrub. If the other timber in the scrub be

short, so will be the kauri; if, on the other hand, the surrounding timber be tall, then the kauri will be taller. The tree, by the time it is 12 inches in diameter, has done all its upward growth. It has reached the free air, and is now at liberty to devote its energies to lateral expansion. Each year sees from 5 to 9 inches added to its circumference—even as much as 12½ inches have been noted. This rate of increase is continued until the tree has attained 50 inches in diameter, when the lateral growth slackens off, but does not cease.

In the case of the hoop pine, it is drawn up through the dense scrub towards the free air until it reaches it, and has attained a diameter of 10 inches, so following the example of the kauri in seeking the light before increasing in diameter, which it does at the rate of from ¾-inch to 1 inch annually.

The red cedar makes three growths per annum after topping the scrub, equivalent to an increase in diameter of 2 inches in three years.

To appply the lesson, let us suppose that one pine-tree is planted at the bottom of a gully in the scrub, and another of equal size on the ridge above. What happens? The first tree will be drawn up towards the light in a tall, straight stem of almost equal diameter at the ground and at the head. The growth will be rapid, given reasonably moist and warm weather, because no portion of the sapling's strength is wasted on lateral growth or in throwing out lateral branches. The tree on the ridge will certainly grow quickly till it has topped the scrub, when it will taper off, and expend its strength on increasing its circumference and in producing an umbrageous head. This is easily exemplified in the growth of lowlier plants. Let us take as an example *Sida retusa* and the jute plant. If either of these be planted singly in the open, they will attain no great height, but will throw out a number of branches when the stem is but 1 foot or so high. Now sow the seeds thickly in some shady spot. It will be found that the stems are drawn up till the jute will have attained a height of from 6 to 8 feet before branching; the *Sida retusa* will reach from 4 to 5 feet before doing so. It is the same with many plants. Now the plain inference is that if we want to produce tall branchless timber, we must follow the teachings of Nature and plant up the ravines and gullies. Even comparatively shallow depressions in the surface of the soil will have a marked effect on increasing the height of the trunk before it branches. I have seen this in a pine forest (the Black Forest) in Germany, where the science of forestry is carried to great perfection.

There the trees are allowed to grow thickly together, that they may be drawn up to a suitable height before the forests are thinned; and then by the time the rotation period has arrived, they expand laterally and form fine thick boles.

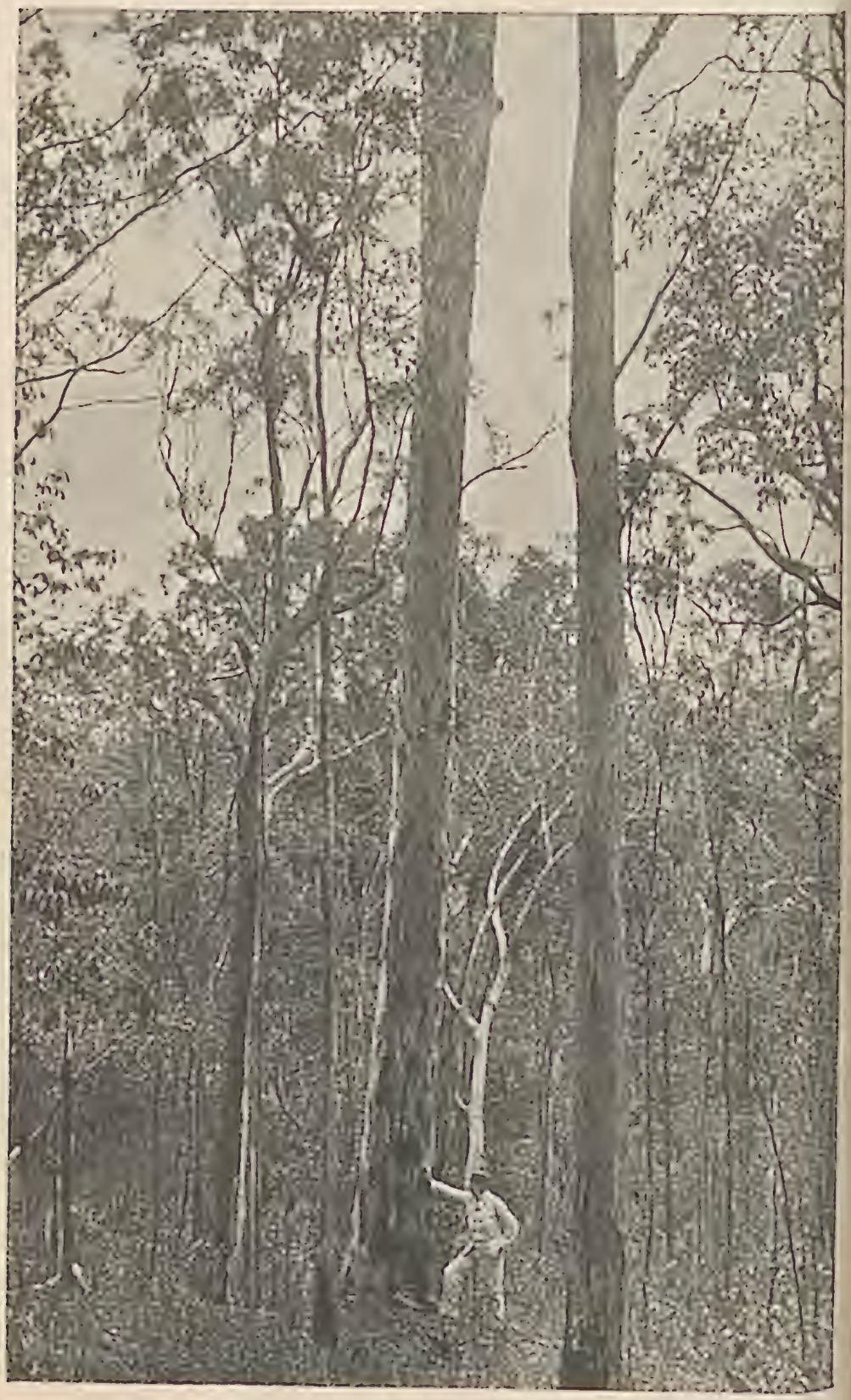
This growth or "drawing up" of trees is what the Germans call "height-growth," and in an article written by Mr. J. Simpson in the *Gardeners' Chronicle* that gentleman defines the term very accurately, and points out those advantages of height-growth which any observant traveller in the bush can see quite plainly.

He says:—The term "height-growth" in forestry is derived from the German. Neither the words nor their meaning have ever had any significance in British forestry practice, and the importance of height-growth as a factor in the production of timber does not appear to have ever been so much as thought of. On the Continent, on the other hand, height-growth is the first thing the forester concerns himself about after he has planted his trees. Get height-growth, he says, and the rest will come. Height-growth has the same significance as "drawn up," an expression well known to gardeners. The editor may perhaps remember me writing to him a year or two back on this subject, and asking for explanations of a puzzle that physiologists have not yet solved—viz., how trees in crowded woods, dells, and ravines get pulled up at such an extraordinarily rapid rate compared to isolated trees in the open; and how more timber is produced to a given area in that way than when the

Plate CLXV.

HEIGHT GROWTH OF FOREST TIMBER ON A HILLSIDE.

Plate CLXVI.



LATERAL GROWTH AFTER HEIGHT GROWTH HAS CEASED.

trees are grown wide enough apart to develop to their utmost extent? Let me give an example or two. For over 30 years I have watched the gradual filling up of a precipitous narrow gully with trees, and marked the comparative progress of the trees on the steep sides of the gully.

At first, when the ravine was planted, a section of it would have appeared like the letter V with the plants (all then about the same size) on each side. But gradually, as the trees grew, the acuteness of the angle of the V grows less and less, owing to the trees lower down growing faster than the trees higher up, until now the tops of the trees are nearly level across the ravine. At the top edge of the cliff the trees are short, and in the bottom tall and cylindrical, and by far the more valuable.

Some time ago I received a sketch of a section of a ravine planted with Scotch firs, near Newry, in Ireland, that would have illustrated my meaning well, but a typewriting company lost it—to their cost and mine, too. This sketch showed the firs as tall as masts in the bottom of the gully, and those at the top, in the exposed field on each side, rough-branching specimens, unfit for anything but firewood, and about half the height of the others. That is height-growth! The Douglas fir pole at Kew is another fine example of height-growth. It is about 160 feet high, and only just a little less in girth at the top than at the bottom. How a timber merchant's mouth would water over that pole! He could enter his saw at one end, and cut one continuous plank out of it 55 yards long, with very few knots. I have twice measured the Douglas fir specimen at Dunkeld, planted about 1845, and now containing well on for 100 cubic feet, and compared it with the Kew pole, much to the disadvantage of the former; for whereas the first represents a perfect timber tree, the other, from the same point of view, is an abortion of the candle-extinguisher pattern, having every fault that a trunk of timber can have—viz., too much taper, and a multitude of coarse knots over its entire surface. The opinions of the saw-mill man and the forester—as distinguished from the tree-lover—are sadly at variance on such subjects.

Mr. Simpson relates that he had to value and sell 20 acres of larch growing at an altitude of 1,300 feet. The ground was very poor, and consisted of a series of hillocks or mounds, so artificial-looking in shape as to suggest that they had been raised by the hand of man. Both the heights and the hollows were planted at the same time—about 70 years ago; and when he valued them standing, the average dimensions of the trees were about 6 cubic feet, yet the trees ran from 1 foot up to 23 feet, according to the position. An average of the two extremes would have given 12 feet as the general average, but what pulled the average down was the number of stunted short trees that grew on the high and exposed knolls, these seldom exceeding 1 foot or 1½ feet, and a careful average had to be taken in every part of the wood. The winding narrow gullies everywhere held the best and tallest trees, some reaching a height of 50 feet where they were drawn up. The total quantity of measurable timber estimated in the lot was 36,000 feet, or a little under 2,000 feet to the acre all over, and it fell just a little over the estimate. Roughly speaking, the trees in the gullies would average about 9 cubic feet, and the poor ones on the high ground about 3 feet, a difference due not to soil, but to the comparative shelter afforded in the different positions and the pulling-up process—the height growth. The wood had never been thinned, and the tall trees varied greatly in girth. All were about the same height; but while some did not quarter-girth more than 3 inches in the middle, others would girth double that and more, showing that the height-growth was not due to shelter alone, but to their being drawn up in the struggle to reach the light.

The illustrations accompanying this article are from photographs taken by Mr. Mobsby, of the Agricultural Department, at Mount Coot-tha. They show the great contrast between trees (mainly spotted gum) growing in the ravines and those growing on the ridges. The tall slender trees shown in Plate I. growing on the side of the ravine are 50 feet high, and only measure 10 inches in diameter 6 feet from the ground. The large spotted gum on Plate II. growing

in the same locality, but close to the bottom of the ravine, shows the height and size attained by these saplings in the course of a few years. This tree is 9 feet in circumference. and measures 60 feet to the first branch. Plate III. gives an idea of the height-growth of trees springing from the bottom of the ravine. These saplings run to a height of from 60 to 70 feet, with a diameter of from 8 to 10 inches.

MR. DAVID LINDSAY ON QUEENSLAND TIMBER TREES.

AFTER completing their inspection of the mining districts, Mr. Lindsay and Mr. Dixon returned *viâ* what is known as the Alberton Scrub route. They found, however, that this so-called scrub, which is about 120 miles long by about 30 miles wide, really consisted of magnificent forests. "For 30 miles," said Mr. Lindsay, "the mule pad took us through some of the finest forest land that I have ever seen. We saw cedar-trees which measured 8 feet in diameter, and many of them were fully 60 feet from the ground to the first branch. Beech-trees and several varieties of pine also grow in this region with equal luxuriance. The forest is about 3,000 feet above sea-level, and is situated on a belt of basalt country which consists of deep, rich soil. Some of this land has lately been sold for 2s. 6d. per acre, and the purchasers have spent about £12 per acre in clearing it, after which they let it to Chinese gardeners at a rental of £1 per acre. The whole of the wood, however, is destroyed by fire, which is, in my opinion, a scandal to the colony, as the timber must be worth at least £20 per acre, especially as it is in such close proximity to the mining districts. Mr. Dixon, who is an enthusiast in all matters relating to forestry, is now endeavouring to induce the Queensland Government to proclaim forest reserves and place them under competent management."—*Adelaide Observer.*

FORESTS OF WESTERN AUSTRALIA.

A CAREFUL calculation has been made by the late Mr. J. Ednie-Brown, Conservator of Forests of Western Australia, as to the extent of forest land in that colony, and the conclusion at which he arrives is that the principal forest surface of Western Australia occupies no less than 20,400,000 acres. These are supposed to contain the different kinds of timber in the following proportions :—

	Acres.
Jarrah (with blackbutt and red gum) ...	8,000,000
Karri	1,120,000
Turat	200,000
Wandoo	7,000,000
York gum, yate, sandalwood, and jam ...	4,000,000

He also estimates that there are over 62,300,000 loads of round, matured timber, the present marketable value of which would be £124,000,000.

Statistics.

QUEENSLAND PRODUCE IN BRITISH MARKETS.

THE exports from Queensland of farm, dairy, station, and plantation produce have now increased, and are regularly increasing to such an extent that it seems to us advisable, in the interests of producers and shippers, to afford as much information as possible on the state of the European produce markets. With this object in view we shall publish each month a market report, giving

Plate CLXVII.

HEIGHT GROWTH OF FOREST TIMBER IN A RAVINE.

the latest average wholesale prices for such produce as Queensland can export to oversea markets. The quotations given will, of course, be subject to the usual market fluctuations, and are neither the highest nor the lowest prices, but the average between the two.

Statement showing the average wholesale London prices of Australian produce to 4th November, 1899:—

Butter.—Choicest, 109s.; finest, 104s.; choicest Danish, 117s. per cwt.

Cheese.—No quotations for colonial cheese.

Sugar.—£14 15s. per ton; German beet, 88 per cent., 9s. 1½d. per cwt.; Java sugar, No. 15, D.S., 11s. 9d.

Molasses.—8s. per cwt.

Rice.—12s. 2d. per cwt.

Coffee.—Coorg peaberry, 71s. per cwt.; Ceylon plantation, 46s. 6d. per cwt.; bold blue sold at 89s.; Santos, 29s. 9d.

Arrowroot.—5d. to 1s. 9d. per lb.

Wheat.—29s. per quarter (3s. 7½d. per bushel).

Ginger.—Calicut, rough, 26s. per cwt.; Jamaica, 52s. 6d. per cwt.

Tobacco.—Virginia Leaf: Common, 2½d. to 6d; good to fine, strips, 4d. to 8d. Kentucky Leaf: Common, 2¼d. to 5½d.; good to fine, 7½d. to 9½d.; strips, fine, 8d. to 11d. Maryland (Ohio), 4½d. to 10d. Java, 4d. to 10d. Turkey, 4d. to 11d. Manilla, 4d. to 4s. Havana, 8d. to 5s. Cuba, 5d. to 2s. per lb.

Wine.—Fair red wine of the Australian claret type in bond, 2s. to 2s. 6d. per gallon; fine old quality, 4s. 6d. per gallon; Bassett's chablis, 12s. to 15s. per dozen quarts (probably duty paid); Kircher's port, £10 per pipe of 108 gallons, equal to about 2s. per gallon; ordinary London port, £10 per pipe of 110 gallons; Marsala, £12 per pipe of 96 gallons.

Green Fruit.—Apples, 21s. per bushel; pears, 3s. 3d. per case; pine-apples, 4s. 6d. each.

Eggs.—9s. 9d. per 120.

Honey.—28s. per cwt.

Olive Oil.—6s. 6d. per gallon.

Wool.—At the wool sales on 9th December the market was very firm. The following average prices were realised:—Nap Nap, 16⅛d; Brookong, 15¾d.; Orion Downs, 15⅞d., Cambridge Downs, 15d.; Wellshot, 14d.; Albilbah, 28⅜d.; Morlana, 9⅜d.; Ayrburg, 25⅝d. Prices for the bulk of merino and fine crossbred wools on 12th December were, on the average, 15 per cent. to 20 per cent. higher than closing rates of the last series. The bulk of medium and coarse, greasy, and scoured medium crossbred wools show an advance of 20 per cent., while for bulk of scoured coarse crossbreds and coarse slipe wools prices are, on the average, 15 per cent. higher.

Frozen Meat.—The following are the latest quotations (to 9th December) for the various descriptions of frozen meat mentioned (last week's prices being also given for comparison):—New Zealand Mutton (crossbred wethers and maiden ewes): Canterbury, 3⅛d., 3 1/16d.; Dunedin and Southland, 2 15/16d., 2 15/16d.; North Island, 2 13/16d., 2 13/16d. Australian Mutton (crossbred and merino wethers): Heavy (over 50lb.), 2½d., 2½d.; light (under 50lb.), 2⅜d., 2⅜d. River Plate Mutton (crossbred and merino wethers): Heavy, 2 9/16d., 2 9/16d.; light, 2 9/16d., 2 9/16d. New Zealand Lambs: Prime Canterbury (32lb. to 42lb.), 4d., *4¼d.; fair average, 3½d. Australian Lambs: Fair average, 3¼d., *3⅜d. Australian Frozen Meat: Prime ox, forequarters,

* Quotation nominal.

3d., 3d.; prime ox, hindquarters, 3 3/16d., 3½d.; secondary, forequarters, 2⅞d., 2⅞d.; secondary, hindquarters, 3 1/16d., 3¼d. The above prices are the official quotations furnished by the Frozen Meat Trade Association. The basis of quotations is sales of lines of not less than 100 carcasses of mutton or lamb, or twenty-five quarters of beef. All the quotations for mutton are for average quality. Quotations for New Zealand and Australian lambs do not include sales of small lambs or heavies or inferior quality.

BACON.—48s. per cwt.

HAMS.—81s. per cwt.

HIDES.—Bullock, 4⅝d. per lb.; horse, 9s. to 16s. 6d. each.

SKINS.—Sheep, from 6d. to 5s. each; lamb, from 1s. to 5s. 6d. each.

TALLOW.—The price realised on 15th December for mutton tallow, fine, was 28s. 3d. per cwt.; mutton, medium, 27s.; beef, fine, 26s. 9d. to 27s. beef, medium, 25s. to 26s.

HORNS.—Good demand all round; not many offered. Extra large, 46s. to 55s.; large, 37s. 6d. to 45s.; medium, 22s. to 32s. 6d.; small, 17s. to 17s. 6d. per 100.

BONES.—Demand continues good. Shanks—round, £5 to £6 10s.; flat, £3 10s. to £4 10s.; mixed, £3 15s. to £4 15s. per ton.

AUSTRALASIAN STATISTICS.

WE take the following Australasian statistics from "The Seven Colonies," just issued by the New South Wales Government Statist:—

LIVE STOCK.

	Sheep.	Cattle.	Horses.
New South Wales ...	41,241,004	2,029,516	491,553
Victoria	13,180,943	1,833,900	431,547
Queensland ...	17,552,608	5,571,292	480,469
South Australia ...	5,076,696	613,894	177,180
Western Australia ...	2,244,888	245,905	62,442
Tasmania	1,493,636	148,558	29,797
New Zealand ...	19,673,725	1,203,024	258,115
Totals	100,463,500	11,646,089	1,931,103

DAIRYING.

	Dairy Cows. No.	Butter made. lb.	Cheese made. lb.
New South Wales ...	416,053	31,483,601	3,245,312
Victoria	399,617	34,080,310	4,397,369
Queensland	*	6,437,256	1,843,803
South Australia ...	77,680	4,559,683	923,123
Western Australia ...	21,141	265,000	700
Tasmania	37,825	*	*
New Zealand ...	333,536	26,250,000	13,250,000

* Not available.

GRAIN.

	Wheat. Bushels.	Maize. Bushels.	Oats. Bushels.
New South Wales	9,286,216	6,064,842	278,007
Victoria	19,581,304	587,064	5,523,419
Queensland ...	607,012	2,252,481	4,047
South Australia...	8,778,900	...	304,002
Western Australia	864,909	1,365	55,854
Tasmania ...	2,303,512	...	2,271,070
New Zealand ...	13,073,416	813,379	16,511,388
	54,495,269	9,719,131	24,947,787

GENERAL.

	Potatoes. Tons.	Sugar Cane. Tons.	Wine. Gallons.
New South Wales	61,900	289,206	845,232
Victoria	161,142	...	1,882,209
Queensland ...	16,413	1,542,090	137,039
South Australia ...	14,445	...	1,080,772
Western Australia	5,698	...	100,000
Tasmania	88,166	...	...
New Zealand ...	298,561	...	...
Totals ...	646,325	1,831,296	4,045,252

General Notes.

THE VALUE OF LEMONS.

Always keep lemons in the house, as they are sure to be in demand for more purposes than one, and are very healthful. It is claimed where a large quantity of lemons are purchased, and there is fear of their not keeping till wanted for use, that if they are placed in a jar, covered with clear water, and the water changed every day, they will keep as long as desired, and are as fresh when removed from the jar as when first purchased.

There are few things as efficacious for breaking up a cold as hot lemonade, taken just before bed-time. It is best, to render this more effective, to bathe the feet of the patient in hot water and mustard, just before retiring, then give hot lemonade to drink. Put the patient to bed almost immediately, there to remain well covered until morning, when, unless there is something more serious than a cold, the latter will have almost wholly disappeared.

To make good lemonade, take a goblet of hot water, and into it squeeze the juice of one good-sized lemon, and sweeten to taste. This makes a strong lemonade, and may not be fancied by some; but it is one of this kind that will do the most good when used as a medicine. For a cough, roasted or baked lemon is good. Put a good-sized lemon in the oven, and let it remain until baked, which will be when the whole is very soft; then take out and add a quantity of sugar to make a thick syrup. Take a teaspoonful of this frequently, keeping it warm, and, unless in a very obstinate case, it will effect a cure in a short time.

The juice of a lemon taken in the morning while fasting is often a preventive of those attacks to which bilious people are so frequently subject. Lemon-juice rubbed over the hands each night before retiring will keep them soft and white. It is good for removing tan, and is a wonderful whitener of the skin.

It is also excellent for taking out stains from the hands. Women who are careful of their complexions, and are fond of vinegar on certain foods, would do well to use a few drops of lemon-juice when any acid is desired, as vinegar has a bad effect on the skin.

A piece of lemon bound on a corn, changing for a fresh piece each day for three days, is said to loosen the corn that it may be easily removed. Do not throw away bits of lemon from which the juice has been extracted, for they are good to keep for cleaning purposes. When the juice is not convenient, they are nice to rub on the hands to remove any ink stain and other discolourations. A piece of lemon, dipped in salt, and rubbed briskly over a copper kettle, will give it a good polish.

Never eat or allow to be eaten bits of lemon left standing for any length of time, more especially where they have so remained in a sick room. Do not throw away any lemon-peel, but dry it in the oven, and keep for flavouring. A bit of this dried peel cooked in apple sauce, or put in an apple pie, gives a delicious flavour that nothing else imparts.—*Australian Field.*

PACKING LEMONS IN WATER.

FROM time to time paragraphs have been printed stating that lemons and oranges can be kept good for long periods by being packed in damp sand. The South Australian *Journal of Agriculture* says that a citizen of Adelaide, since deceased, packed several hogsheads with lemons, headed them in, and filled up with rain-water. These lemons were carried to London in a sailing ship as ordinary cargo, and arrived as fresh and full as the day they were picked. Mr. J. W. Cardon, of Mildura, has for two years past packed oranges in damp sand for some time, and out of 70 cases this season hardly 1 per cent. was spoiled. All the rest were perfectly sound.

TO INCREASE THE SIZE OF MELONS.

THE following is said to be an excellent way of increasing the size of melons:—Before the melon has attained its full size, and while in a growing condition, insert one end of a strip of fine cotton cloth, about ½-inch wide and 3 or 4 inches long, into the stem of the melon, by splitting the stem with a sharp knife, and place the other end of the strip into the neck of a wine-bottle filled with water, inclining the bottle so that the water may be absorbed by the string, which acts as a syphon, and the end on the outside of the bottle should be a little lower than that which is within the bottle, and in twenty-four hours the bottle should be refilled, as the water will have been imbibed by the melon, and in a week or 10 days will have attained its full size. You will then withhold the water to give it a chance to ripen, otherwise it will be quite insipid and unfit to eat.

ONIONS FOR VERMIN.

A FARMER who, to cure vermin on stock, had to use various remedies, among the rest kerosene and lard, camphor dissolved in alcohol, and carbolic mixed with lard, and all without the desired success, writes that finally he tried onions. Of the result he says: One particular animal, a yearling bull, was very full, even after using the other remedies. I took a large onion, cut in two, and rubbed him hard all over till I used two or more onions. The second day I examined him, and to my astonishment and joy the hair was full of dead insects, but not a live one could I find. Since then I have treated all the stock in the same way.

DEPTH AT WHICH TO SOW WHEAT.

An English experiment as to how deep grains of wheat will sprout and come up disclosed the fact that out of 50 grains deposited 8 inches deep, only two came up, and these formed no heads. When covered 5 inches, 10 out of 50 came up, but the heads were not perfect. All that were planted 3 inches deep came up, but the best results came from the grain that had been deposited 2 inches in depth. Still, depth of covering is very largely a question of the character of the soil.

SHORT *v.* LONG SILAGE.

Silage should not be cut too short. There are certain lengths at which it is digested more easily than at other lengths. Some years ago, at a convention held in Wisconsin, an investigator made a report on the kind of feed that was found to be easiest digested by cows. He had examined a number of cows' stomachs, and had also fed silage and cut corn fodder to cows, and noticed at what lengths least of it showed in the droppings. He found that when the fodder was cut short, say ¼-inch long, much of it appeared in the droppings; but that when the fodder was cut 1¼ inch long, it all seemed to be digested.

INOCULATING THE SOIL.

The *Australian Pastoralist* says:—The Alabama Experiment Station (America) has made some experiments in this line with astonishingly good effect. Four plots of one-fortieth of an acre in extent were experimented with, the crop sown being the hairy vetch. The soil was of a poor nature, and was manured at the rate of 400 lb. of superphosphate and 120 lb. of sulphate of potash per acre, no nitrogenous manure being applied. Two of the plots were inoculated with the nitragin cultivation in addition to the manures, while the other two plots received only the superphosphate and sulphate of potash. The process of soil inoculation was carried out in the following way:—Some earth was taken from a lawn belonging to a garden, which for several years previously had grown luxuriant crops of the common vetch, and which was consequently rich in nitrogen-fixing bacteria, and of this a solution was made in water. In this solution seeds of the hairy vetch were steeped before sowing. All the plots were cut on the same day, but the produce of two only—an inoculated one and an uninoculated one—were weighed. The uninoculated plot yielded 900 lb. green forage, which produced 232 lb. dried hay; while the inoculated plot yielded 9,136 lb. green forage, which produced 2,540 lb. dried hay, being nearly ten times as much of the produce of the uninoculated plot. The cost of inoculating was found to be a little less than 9s. per acre.

VINES AND FROST.

Anything that will avert danger to vines and fruit trees from late ground frosts is of interest. It has been confidently asserted and reasserted, after trials made in California, that spraying the stems and branches of vines and fruit trees with any kind of whitewash will delay growth from a fortnight to four weeks. It is maintained that early growth is controlled not so much by soil temperature as by the action of the warm air on the stem and branches of the plants, and that by the application of air-slacked lime or whitening to those parts the heat is radiated, so that the awakening from the winter sleep is retarded for the period above mentioned.

DROUGHT-RESISTING GRASS.

The Secretary of the Agricultural Department of the United States has recently been making efforts to discover a drought-resisting grass suitable for the more arid regions of that country, and has succeeded in finding a variety that stood six months of drought. The grass is *Bromus inermis*. It comes from the steppes of Russia. Experiments made in California showed that it withstood

six months' drought without loss of a plant. When rain came at the end of that time the plant quickly revived, and grew to the height of 2 feet. It has very deep roots, which penetrate the soil in search of moisture. It is hoped the plant may turn some of the barren wastes of the American Far West into money-making pastures.

PREVENTING JAM FROM BURNING.

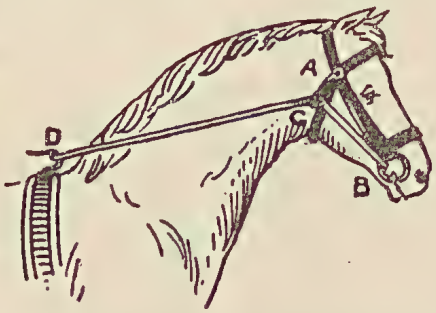
To avoid the labour of constantly stirring the jam, place half-a-crown in the bottom of the cooking pan before putting the fruit in. You will find (says *Australian Farm and Home*) that the trouble will be overcome. The movement of the coin caused by the operation of boiling prevents burning quite as effectually as stirring will. Remember that the effect will be spoiled if any stirring is done.

TO CURE PORK WITHOUT BRINE.

FOR 100 lb. of pork, take 2 quarts of salt, 3 lb. of brown sugar, and 3 oz. of saltpetre. Pulverise the saltpetre as finely as possible, and mix it thoroughly with the salt and sugar. Now rub a little of the mixture on the rind side of your pork, and then apply the remainder on the flesh side, rubbing it in well with the hand. Pack it in a box or barrel which is not very tight, to let the drippings run off. Rub on each piece as you put it into the box. After 24 hours take it out and apply 2 quarts of pure salt in the same manner, if the pieces are very large; but, if small, 1 quart is enough. Leave it for three or four weeks, and then it is ready for smoking.

AN ANTI-KICKING DEVICE.

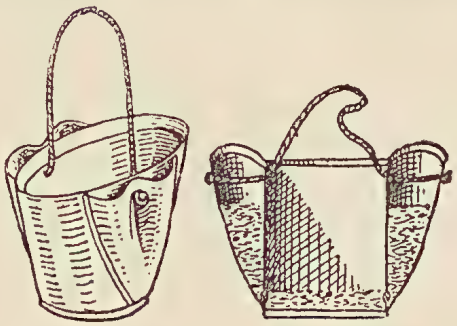
SOME horses are prone to kick. When an animal addicted to this habit has to work in harness, it is not always a pleasant or an easy matter to have to manage it. Damage more often than not ensues either to horse or vehicle, the chances being against the horse if the build of the cart is heavy, while a gig or a light dog-cart is soon reduced to smithereens by a vigorous kicker. The habit can be easily checked and eventually cured in the worst offender by a simple device involving practically neither cost nor trouble. The anti-kicking arrangement



consists of a double over-check drawn tight, so that the animal cannot draw down his head, which a horse always does when about to give play to his heels. Take a strap a little longer than an ordinary bridle rein, about ⅝-inch wide, with a buckle at each end, and attach on one side to shorten or lengthen. Then fasten to head-piece A on an ordinary bridle down and through the ring of the steel bit B, such as is used with over-check, and on through loop C of common bridle to hook D on back pad, and continue so on other side. No one would suspect that it was an anti-kicker, but the horse would quickly make the discovery, much to his astonishment and discomfort when he started his old game.—*Farmer and Stockbreeder.*

A NOVEL NOSEBAG.

A serviceable and simple invention has been patented by Mr. L. Arnott, of Cork. It is an adoption of the principle existing in the mechanism of the magazine rifle and the cab candle-holder to the nosebag for horses. It is a very common sight, when a horse has half eaten his feed, to see him pitching the bag into the air or otherwise striving to get the remainder of the contents



within reach of its mouth. By Mr. Arnott's contrivance this difficulty is overcome by means of a spring at the bottom of the bag, which is capable of extending from a few inches when compressed up to 1 foot when relieved of pressure. Above the spring is a false bottom, and as the animal reduces the weight of his feed, so the false bottom naturally rises and keeps the level of the feed up to nearly the top of the bag.—*Martin's Home and Farm.*

ANOTHER NEW FEEDBAG.

A patent feedbag of a very sensible description is here shown. It has no springs, chains, or metal tubes, and so serviceable is it that a horse can trample on it with impunity. The nosebag is devised to save grain and give comfort to the horse. The grain to be fed runs into the bottom of the bag from the side-pockets through a small aperture. The pockets are collapsible, and the pressure

on the grain in those receptacles, induced by the cord tightening with the weight of the bag, renders the supply of grain to the horse automatic. When in position on the animal's head, his lips are always within reaching distance of

the bottom of the bag. So long as the bottom is covered to a depth of one or more inches, the grain at the sides cannot flow in. It is a simple but effective arrangement.—*Farmer and Stockbreeder.*

WATERING IN DRY WEATHER.

WHEN vegetables begin to look parched, and the ground becomes dry, some gardeners think they must commence the use of the watering-pot. This practice, to a certain extent, and under some circumstances, may, perhaps, be proper, but as a general rule it is incorrect. The same time spent in hoeing, frequently stirring the earth amongst vegetables, is far preferable. When watering has once commenced it must be continued—must be followed up, else you have done mischief instead of good; as, after watering a few times, and then omitting it, the ground will bake harder than if nothing had been done to it. Not so with hoeing and raking. The more you stir the ground among vegetables, the better they are off; and whenever you stop hoeing, no damage is done as in watering. The hoe is better than the watering-pot.

A SUBSOIL PLOUGH.

A WRITER in the *California Orchard and Farm* says:—On one ranch we found a subsoil plough running, drawn by six large mules, and controlled by two men. The business part of the plough is a steel shank 20 inches long, and made sharp like a knife colter, and fastened firmly at the upper end into a large wooden beam. The lower end of the shank is mortised into a steel ingot about 2 feet long, flat on the bottom, cigar-shaped on top, with a chisel-shaped point and 6 or 8 inches wide throughout its length. It runs horizontally under ground like the bar of an ordinary plough, only 16 or 18 inches below the surface, making no more indication of what is going on below than a submarine boat, the only evidence of its use being a small mark left by the shank. The implement is run twice between rows each way, and, as the trees are planted quincunical, it is run diagonally, thus breaking up the hardpan under the entire space not occupied by the larger tree roots. Irrigation follows, and the water penetrates freely to the lower feeders. It is a success, and has solved the problem of dry-year hard-panning. There is no patent on this subsoil implement, and it may be made by any good blacksmith. It is the most effective plough for rendering irrigation easy and thorough, and by the use of a little judgment it is harmless to the roots of the trees.

TREE FELLING BY ELECTRICITY.

IN the immense forests of Galicia (Austrian Poland) the trees are felled by electricity. No saw is used, but, instead of this, a number of augers are employed. These augers are turned by a small engine driven by electricity.

AUSTRALIAN CATTLE AND SHEEP FOR SOUTH AFRICA.

WE learn that a most successful shipment of fat stock was made by the ss. "Warrnambool" from Sydney for Durban, Natal. The shipment consisted of 1,800 sheep and 60 bullocks. The number of sheep shipped is stated by one journal to have been 18,000, but this is a palpable mistake. During the voyage 100 sheep were lost. The remainder arrived in splendid condition, and realised high prices, the sheep bringing 30s. and the bullocks £20 per head. The gross return was thus £2,550 for the sheep, and £1,200 for the cattle—a total of £3,750, which would have been increased by £150 had no sheep been lost.

At top prices last month the cattle would have sold at the Enoggera sale yards for £7 per head, and the 1,800 sheep (if wethers) at 15s. 2¼d. per head; or £420 for the cattle, and £1,366 17s. 6d. for the sheep—a total of £1,786 17s. 6d., showing a balance in favour of the Natal market of £2,113 2s. 6d., from which must be deducted shipping, freight, feed, commission, losses, and other expenses.

EXPORT OF VICTORIAN BUTTER.

Victoria's output of butter this season will not fall far short of 15,000 tons. Up to the end of November the quantity shipped to London and South Africa reached 7,674 tons. Add to this 700 tons ready for shipment, and our total reaches 8,374 tons, as against 4,507 tons during the corresponding period last year. The estimated shipments for December are 3,000 tons; January, 2,000 tons; and February, 1,000 tons. If these estimates be realised, and all the conditions are at present highly favourable, the exports to London and South Africa for the season will amount to 14,374 tons. It is further estimated that Western Australia will require fully 1,000 tons of Victorian butter this season. This brings the grand total up to 15,374 tons. It is pretty safe, therefore, to predict that Victoria's total output for the season will reach about 15,000 tons.

PRESERVING FRUIT.

With the advent of the fruit season, the thrifty housekeeper has to turn her thoughts to the preparations of jams, preserves, and canned or boiled fruits. We are not quite prepared to satisfactorily define the difference between a jam and a preserve. What one would call a preserve, another would call a jam, just as one man might term himself a "travelling merchant" whom another would call a hawker. Probably the following will be generally accepted as a sufficient distinction:—

Preserves are fruit boiled very gently in sugar in order to preserve the shape of the fruit as nearly as possible. In this case, the water is either driven off or is altogether replaced by a rich sugar syrup. The sugar preserves the fruit, so that it is not necessary to seal the vessel in which it is stored.

Jam is fruit boiled with varying proportions of sugar, so that the fruit is converted into a pulp. In some cases, particularly in home-made jams, sufficient sugar is added, and the jam is sufficiently boiled to keep without sealing. In such cases there is no difference between a jam and a preserve except the time and care taken in making. More frequently, and especially in commercial jams, the pulping is completed by working the boiled fruit through sieves before adding sugar, and the certainty of preservation is secured by the sealing of the tins or jars while the jam is hot.

Canned and bottled fruits, which are frequently called preserved fruits, are fresh fruits packed in airtight cans, jars, or bottles, with or without sugar, and pasteurized by heat. The absolutely essential conditions are—(1) That the fruit shall be raised to a temperature of over 140 degrees Fahr. for 15 or 20 minutes, or at a higher temperature for a shorter time, so that all active germs will be destroyed; and (2) that the tin, jar, or bottle shall be so sealed that ferment germs cannot gain access. It is not necessary that they be hermetically sealed, although, in actual practice, that is the one economically practicable method. Bottles can, however, be plugged with dry sterilised cotton wool; and provided the plug is properly put in, and the bottle kept in a suitable place, it will keep well as if sealed with wax.

We mention this because the more clearly the principle is understood the more certainly will people be able to command success. It will be noticed that it is not necessary to boil the fruit, and it is not necessary to add sugar. In practice we advise our readers who intend to preserve fruit to heat it to the boiling point, and to add syrup. We advise them to let the fruit come to the boil, because that makes it certain that all germs will be destroyed, and to add syrup because the fruit is then ready for use when the tin or bottle is opened.

Any plan is best for the individual which secures the results aimed at with the least expenditure of time and trouble.

1. The Cannery System.—The fruit is sorted of an even size and an even degree of ripeness. Apricots are halved; peaches peeled and halved; pears peeled, quartered or sliced, and cored; and other fruit prepared as desired. The prepared fruit is packed closely in the can, and a syrup to suit the taste of the

preserver is added to fill the can. The top is then soldered on, a vent-hole being left in the middle. The cans are then arranged in a tray, which is plunged into boiling water until the cans are reaching the boiling point. The tray is then lifted, and the vent-holes are rapidly soldered, and the tray again lowered into the boiling vat until the fruit is cooked. The process is simplicity itself, except in judging how much cooking is required. This varies from 1 or 2 minutes to perhaps 15 minutes, with the variety, size, and ripeness of the fruit, and is a matter of experience, because, unless the cans are plunged into cold water as soon as they come out of the vat, the cooking process goes on for a long time.

2. HOME METHODS.—(*a*) One home method is to follow as nearly as possible the cannery system.

(*b*) Fill the cans or jars with fruit and syrup, and put them in a preserving pan with a thin perforated board, a few thicknesses of thick brown paper, a layer of matting or similar material to keep the jars from direct contact with the pan. Fill the pan with water, so that it will stand three parts of the way up the outside of the jars. Boil until the fruit is partly cooked, and take out and solder or otherwise fasten down while quite hot. If the cans stand in a warm place, the cooking goes on for some hours. If, therefore, the fruit is fully cooked when it is taken off, it is found to be overcooked, or may be "mushy" when opened. The essential factor in success by this method, which is the one generally adopted when patent topped tins and patent jars are used, is to see that the tins or jars are hermetically sealed while hot. They will not keep otherwise.

(*c*) A third plan is to cook the fruit in the tins or bottles, as in plan (*b*), and then add the syrup boiling hot, when the jars are taken out, sealing immediately as before.

(*d*) A fourth plan is to cook the fruit in syrup in an enamel or copper stew pan, which, to preserve the fruit unbroken, should be double—*i.e.*, one pan within another with a wetter space between; and when it is ready, ladle it into the cans or jars and seal up as before. When this process is followed, it is not wise to let it be cooked too much before filling. On the other hand, it should be ladled in before it begins to break, because the cooking goes on while the jars are cooling, especially if they are packed together.

SYRUP.—This should be made to suit the taste of the maker. Some use as much as 2 lb. of sugar to 1 quart of water, others 1 lb. to 1 gallon of water. We prefer a weak syrup, and add sugar when using if taste demands. The sugar should be best crystal, and be boiled in the water.

SEALING.—When tins are to be soldered the only precaution is to see that the soldering is properly done. When Simpson's or other patent topped cans are used, a percentage is apt to prove not perfectly airtight, or the tops are mixed and not properly put on. To make sure of the results, most housekeepers find it advisable to run in a mixture of tallow and whiting, wax, or resin and wax.

Last year we published the following method, and asked readers to give it a trial. Several did so, and reported complete success. We, therefore, feel that we are safe in recommending its adoption. By it fruit can be readily preserved in any wide-mouthed bottle or jar with a neck, which will enable the cover to be tightly tied on. The following is the plan:—

Put the fruit into a preserving pan with syrup. Heat the fruit in the syrup just long enough to scald it through. The fruit should be in good condition—ripe, but not over-ripe. The jars or bottles are properly cleaned and heated either in the oven or by putting them into a copper of warm water, and raising it to the required heat. When the fruit is scalded through, it is ladled into the bottles very carefully, so as not to smash the fruit; fill the bottle full.

Wipe the top of the bottle and outside the neck perfectly dry. Have ready a piece of white paper cut so it will fit inside the mouth of the bottle, and lay it on top of the fruit. It is still better if the paper is dipped in spirit. Now it is ready for sealing.

To Seal the Bottles.—This wax should, of course, be made before the fruit is cooked. Melt together in a tin 1 lb. of resin, 2 oz. beeswax, and 1½ oz. tallow or mutton fat without salt. Cut sufficient Canton flannel or similar material, such as thick flannelette, into squares large enough to cover the tops of the bottles or jars, and allow of being tied round the neck. Dip these into the resin compound, and allow them to drain and dry sufficiently to be easily handled. Having these quite ready when the bottles are filled, one is placed over the top as tightly as possible, and bound tightly round the neck with a piece of soft twine. Then with a spoon place a little of the melted wax on the top and spread it over the cloth, and over this place a piece of flexible tough paper, large enough to cover the top and neck, smoothing it neatly over, and the bottle is effectually sealed. As soon as it is cool, a glance will show whether it is sealed properly, for the top will be depressed. The least hole to admit air will prevent this concavity, and show that the bottle will not keep. The only drawback to the plan is the fact that the warm wax sticks to the fingers. Methylated spirits or turpentine will remove it. It will not affect the fruit.—*Garden and Field.*

AGRICULTURAL AND HORTICULTURAL SHOWS.

The Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respective shows, notify him of the date, and also of any change in date which may have been decided on.

ZILLMERE SHOW.

The first summer show—fruit, flowers, and vegetables—of the Zillmere Horticultural Society is announced to take place in the School of Arts, Zillmere, on Saturday, 20th January, 1900. This show should prove very attractive, as Zillmere is in the heart of a fine fruitgrowing district, which includes Nundah, Nudgee, and other places celebrated for their pineapples, small fruits, and vegetables.

The Markets.

AVERAGE PRICES FOR NOVEMBER.

Article.		NOVEMBER Top Prices.		
		£	s.	d.
Bacon	lb.	0	0	7
Bran	ton	6	7	6
Butter, First	lb.	0	0	10
Butter, Second	,,	0	0	7
Chaff, Mixed	ton	3	9	0
Chaff, Oaten	,,	4	5	6
Chaff, Lucerne	,,	3	4	0
Chaff, Wheaten	,,	2	15	0
Cheese	lb.	0	0	5
Flour	ton	9	18	0
Hay, Oaten	,,	3	10	0
Hay, Lucerne	,,	2	4	0
Honey	lb.	0	0	1¾
Rice, Japan (Bond)	ton	16	2	0
Maize	bush.	0	4	3
Oats	,,	0	3	3
Pollard	ton	6	12	0
Potatoes	,,	4	5	0
Potatoes, Sweet	,,	1	12	6
Pumpkins, Table	,,	2	9	0
Sugar, White	,,	15	0	0
Sugar, Yellow	,,	12	6	0
Sugar, Ration	,,	10	8	0
Wheat	bush.	0	3	7⅖
Onions	cwt.	0	6	0
Hams	lb.	0	0	10
Eggs	doz.	0	0	8½
Fowls	pair	0	4	1⅘
Geese	,,	0	6	6
Ducks, English	,,	0	4	2⅖
Ducks, Muscovy	,,	0	5	11
Turkeys, Hens	,,	0	8	0
Turkeys, Gobblers	,,	1	1	0

ENOGGERA SALES.

Article.	NOVEMBER. Top Prices.		
	£	s.	d.
Bullocks	7	13	0
Cows	5	15	0
Wethers, Merino	0	14	1⅕
Ewes, Merino	0	10	4½
Wethers, C.B.	0	13	0¾
Ewes, C.B.	0	10	11
Lambs	0	12	9
Porkers	1	5	2
Slips	0	8	3

Orchard Notes for January.

By ALBERT H. BENSON.

The Orchard Notes for the month of December apply equally to that of January, especially the remarks anent the handling and marketing of fruit and the treatment of various fruit pests. The fruit of the month is the grape, and growers should take every care to market this fruit properly. The fruit should be cut when dry and cool before the heat of the day, and should be firmly packed into cases of moderate size, as if the grapes are at all tender they are apt to be badly crushed if packed in too large cases. For shipping high-class grapes such as Black Muscat of Alexandria, White Muscat of Alexandria, Waltham Cross, or even Raisin de Dames, I strongly advise growers to use 5-lb. chip baskets, eight or ten of which go to a crate, as the fruit carries better in them and will reach its destination with the bloom on if well packed and carefully handled. The fruit should be sold in the chip basket, so that the purchaser gets the grapes as packed in the vineyard and without being handled by the retailer. This method of packing grapes is common in California, especially where the fruit has to be shipped long distances; and as our best grapes here come from the Roma and Mitchell districts, and are often more or less damaged in transit, it should be of value to us in that it would enable the fruit to be marketed in a better and fresher condition than is the case at present.

I do not think such chip baskets are obtainable in Queensland, but if not they could be easily introduced, as they are now coming into regular use in Melbourne.

Mangoes will also be ripening in the Southern part of the colony towards the end of the month, and I strongly advise, if any are to be shipped to the Southern colonies, that none be sent unless they are of good quality, as the carrot-flavoured stringy rubbish that has been sent in the past has simply killed the demand for mangoes in the Southern markets, and it willl be impossible to open up a trade for our fruit there unless it is of good quality, and this good quality must be maintained. As there is a great deal of uncertainty as to what constitutes a good mango, I may say briefly that a good mango should be fibreless or nearly so, and should have no pronounced unpleasant flavour of carrots or turpentine, but should be either a luscious, high-flavoured fruit or a juicy, good-flavoured, sprightly fruit. Too large mangoes are not an advantage, a round mango of 6 to 8 oz. weight being about the best size and shape for packing and carrying.

I would be glad to receive samples of the fruit and foliage of any mangoes that the grower may consider to be of special merit, with a view to making drawings of and keeping a complete record of same, so that we may have reliable information as to the best varieties of mangoes in the colony, and know which are best to propagate. In addition to sending the fruit and foliage, I would be glad for the grower to supply information respecting the source from which the tree producing the fruit was derived, the nature and habit of growth of the tree, whether it is a good or bad cropper, and the class of soil it is growing in.

During the month see that the orchard is kept well cultivated; and in dry districts, where there is water available, citrus trees should receive a good irrigation. Keep the nursery clean, look after all grafts or spring buds, and see that they are growing clean and straight, and where strong enough head back at the height at which it is desired to form the head of the

tree. Budding of all kinds of fruit trees can be done during the month, the only requisites to success being that the buds are fully developed and that the bark of the stock runs freely. For budding use a very sharp knife, and see that you cut your buds thin—*on no account remove the wood from the bud*, as it only makes the operation slower and does no good; in fact, the quicker the budding is done, and the less the inner bark of the bud or stock is exposed, the better will be the take. Always tie your buds firmly, especially so at the base of the bud, as it is there that the union must take place. As soon as the bud has taken properly, the tie should be cut; otherwise they are very apt to cut into and destroy the stock.

Farm and Garden Notes for January.

Farm Notes.—The main business of the farmer during this month will consist of preparing the land for future crops, keeping growing crops clean, being careful to destroy all weeds before they seed, always bearing in mind the old adage, "One year's seeding is seven years' weeding." A little maize may still be sown for a late crop. In some localities early potatoes may be sown; they should be planted whole, and have plenty of room, or they will be drawn up. Such early sowing, however, must not be relied upon to prove successful, and can only be looked upon in the light of an experiment. Sow sorghum, imphee, Cape barley, vetches, panicum, teosinte, rye, and cow peas.

Kitchen Garden.—The great heat of the weather during the present month will militate greatly against successful sowings of seeds; but with care much may be done. Shading and watering are the main points to be attended to. Vegetable beds should be freely watered in the evening. A mere sprinkling is useless. The beds should receive a good soaking. Mulching will be found of great benefit, and also a slight dressing of salt. The mulch may consist of stable litter, tan, straw, or grass. All unoccupied land should be dug, and green refuse, such as cabbage leaves, turnip tops, &c., turned under, as they form a valuable manure. Heavy land should be turned over, the lumps broken roughly, as the exposure to the sun will greatly improve the texture of such soils. When the weather is favourable, sow French beans, cress, cauliflower, mustard, cabbage, celery, radish, for autumn and winter use. Parsnip, parsley, radish, turnip, Brussels sprouts, carrot, peas, and endive may be sown, as well as a few cucumber and melon seeds for late crop; the latter are, however, not likely to succeed except in very favourable situations. Such seeds as cabbage, cauliflower, celery, &c., should be sown thickly in small beds under a light covering of canvas or brush, and the beds kept well watered until the plants are strong. In favourable weather plant out cabbage and cauliflower. Gather herbs for drying. Gather onions, garlic, and eschalots as the tops die down. When planting out cabbage, &c., protect the plant from the sun for a few days until the new roots are formed.

Flower Garden.—Sowings should be made in boxes under cover or in sheltered prepared seed-beds for early plants—cineraria, primula, gloxinia, calceolaria, pansy; for late blooming—Sweet William, calendula, balsam, gaillardia, zinnia, coreopsis, dianthus, &c. Tie up and stake all tall-growing plants. Dahlias that are in flower may be thinned out and tied to stakes. Weeds must be kept down, and, to keep up a good show of flowers, constant watering and attention will be necessary, especially if the weather is hot. Plant dahlia bulbs for late blooming, if not already done; also make cuttings of any good variety from medium-grown wood, planting same in sandy soil under fair circumstances, thus getting nice healthy young bulbs for next season.

Horticultural Notes.

By PHILIP MAC MAHON,
Curator, Botanic Gardens, Brisbane.

The average mean shade temperature for January at Brisbane is 76 degrees, and the average mean rainfall is 7·10 inches. The weather during the month is usually muggy, the air being very moist, and the growth of plants consequently rapid.

During the early part of the month, should we be favoured with rain, it is a good time to plant all tropical plants, and the first sowing of seeds of annuals for the flower garden will require to be made. The ease with which a person can provide a stock of annuals sufficient to make any garden gay during the autumn and winter months is not generally recognised. Small boxes or pans—a separate one for each variety of seeds—should be prepared ; and a compost, into which decayed leaves largely enter, should be got ready. The compost should be of such a consistency that, when taken in the hand and squeezed, it will fall asunder at the slightest touch. In sowing annuals, let them be sown thinly, so that a little delay in pricking off may not do them so much harm as if sown thickly in the first instance. The surface of the soil should never be watered so heavily as to wash it about ; and when the young seedlings are large enough to handle, they should be lifted one by one and, with the aid of a label or knife, planted into beds or boxes of very light soil, still with a goodly proportion of leaf soil. Even if they seem thin enough in the seed-boxes, it is better to prick them off in this way. You must look out for insects. The marauding slug dearly loves the succulent young annual, and will go a long distance (for a slug) to get it. A quantity of soot or ashes thrown in his path has a most discouraging effect, and makes him think the game hardly worth the candle.

All kinds of shrubby plants may be propagated by cuttings, these being chosen in the majority of cases with a heel of old wood. That class of *Pelargonium* commonly called "geraniums" may also be readily propagated in this way. These plants do remarkably well in Queensland, and yield some splendid flowers. Of course you can propagate coleus, crotons, and all kinds of tropical foliage plants this month very readily. By stretching a piece of thin calico on a frame of lath, it is possible to make a capital propagating frame which will serve to keep the air moist around your cuttings and to prevent currents of air, which by carrying off the moisture from the cuttings often prove fatal. Weeds, too, will not grow so readily where there is a slight shade kept by this means.

During this month you will have to pay particular attention to all pot plants. There is so much growth that plants grown under the artificial conditions of plant-houses will, if they are allowed to become dry, easily sustain permanent injury. When a pot plant becomes thoroughly dry, it is often impossible to water it by means of the ordinary watering-can, as the water runs off through the loose earth on the outside, and, although the plant appears to be thoroughly well watered, it is quite dry in the middle of the ball of earth which surrounds its roots. The remedy is to stand the pot in a bucket or basin of water until air-bubbles cease to be given off.

There is a tendency at this season, both indoors and out, to over-water. As was pointed out last month, this requires to be carefully guarded against. A stringent ukase against the undue use of the garden hose in suburban gardens would do as much as anything to enhance the beauty of their floral occupants.

Look out for insects this month. The scale insects especially will be increasing at a great rate, and will need a wary eye to keep them under control. The difficulty in dealing with these pests often is that the trees which they love the most are tall and difficult to get at. By balancing a long bamboo across an upright arrangement supported in a cart or wagon, and swinging it about like a gigantic fishing-pole, we find it possible to reach trees at a considerable height. A photograph of the arrangement will be shown next month. In this way the scales on lofty trees can be treated to a dose of resin-wash or kerosene emulsion, or, what we use very frequently, kerosene simply mixed with the water by means of the mixing arrangement attached to the Doncaster spray pump. This method of using kerosene saves a great deal of trouble in mixing, and leaves a very fine film of the oil over the leaves. It is, however, best adapted for trees and plants with hard leaves, for we find that it injures foliage which is at all delicate. The quantity of kerosene can be regulated very nicely by the apparatus, when one has had a little experience of it, and, of course, a larger quantity of kerosene is used with a tough than with a delicate subject.

Propagate verbenas, choosing only the best varieties. It is better to have two or three well and distinctively coloured sorts than a large variety of washy colours. They will make a great display by-and-by. The variety known as Foxhunter makes a perfect blaze of scarlet, and requires to be planted in a mass, or in a long line in a border, where it shows up well. They like tolerably rich ground.

Palms may be planted out all through the month. If the weather should prove at all dry, see that the young trees are shaded, and in planting disturb the roots as little as may be. Lawns must be well looked after. Where there is a paucity of labour, which is a common case everywhere in Queensland, these are apt to get out of hand, and January is a month during which it is a most difficult task to keep them looking well. We use an ordinary Buckeye agricultural mower for the larger lawns, and for the finer lawns a Shanks golf links machine. This is a great improvement on the old lawn mower, as it is provided with springs which enable it to "give" with any inequalities of the ground. The grass-collecting arrangement has been removed, and the grass is allowed to fall on the lawn and to remain there. It soon withers up, and becomes a protection to the grass, not being in the least unsightly. The surface of the ground in beds and borders must be kept stirred to a depth of about 3 inches, and weeds must be fought. Do not let them seed.

If you have a kitchen garden—and there is no reason why you should not—this is the month to begin operations. And if you have not a garden of vegetables and herbs, you cannot make a better new-year resolution than to have one at once. A very little one will keep you and your family in vegetables for the whole year round. The quantity of meat which is eaten in this country without the necessary accompaniment of sufficient vegetables is appalling. There is a Chinaman in Albert street, Brisbane, who has a few square yards of a garden, and out of that tiny patch he manages to get in the course of the year a supply of vegetables which, if they were all placed together, would make the owner of many a larger holding stare. The cottager who wants to start a vegetable garden may sow the following:—Beans, beets, brocoli, Brussels sprouts, cabbage, choco, carrots, cauliflower, celeriac, egg-plant, endive, lettuce, parsley, peas, radish, spinach, tomatoes, turnips, all sorts of pot herbs, mustard and cress at short intervals. Towards the end of the month make another sowing of these. You will find the watching of your seedlings, and the care of them in pricking them off and defending them against their insect enemies (which beset them even more persistently than in the case of flower seedlings), a most interesting occupation.

Public Announcements.

THE Editor will be glad to receive any papers of special merit which may be read at meetings of Agricultural and Pastoral Associations in Queensland, reserving, however, the right to decide whether their value and importance will justify their publication.

THE *Queensland Agricultural Journal* will be supplied to all members of Agricultural and Horticultural Societies who do not derive their livelihood solely from the land, on payment, in advance, of an annual subscription of 5s.

LIST OF AGRICULTURAL, HORTICULTURAL, AND PASTORAL SOCIETIES AND ASSOCIATIONS IN QUEENSLAND.

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Allora ...	Central Downs Agricultural and Horticultural Association	J. H. Buxton... ...	
Avondale ...	Avondale Farmers' and Planters' Association	N. J. Mikkelsen ...	
Ayr	Lower Burdekin Farmers' Association ...	Winsor H. Wilmington	
Beaudesert ...	Logan and Albert Pastoral and Agricultural Society	M. Hinchcliffe ...	23 June
Beenleigh ...	Agricultural and Pastoral Society of Southern Queensland	Wilson Holliday ...	14 April
Biggenden ...	Biggenden Farmers' Association	Charles H. Peppin ...	14 June
Birthamba ...	South Kolan Agricultural and General Progress Association	G. W. Nixon ...	
Blackall ...	Barcoo Pastoral Society	F. Clewett	
Boonah ...	Fassifern and Dugandan Agricultural and Pastoral Association	J. A. McBean ...	18 and 19 May
Bowen ...	Pastoral, Agricultural, and Mining Society ...	J. E. Smith	17 Aug.
Bowen ...	Preston Farmers' Association, Lower Proserpine	G. Archer	
Bowen ...	Proserpine Farmers' and Settlers' Association	G. W. Pott	
Booyal ...	Booyal Farmers' Progress Association ...	Thos. Skillington ...	
Brisbane ...	Horticultural Society of Queensland	J. F. Bailey	10 and 11 Oct.
Brisbane ...	Moreton Agricultural, Horticultural, and Industrial Association	J. Duffield	
Brisbane ...	Queensland Acclimatisation Society	E. Grimley	
Brisbane ...	Queensland Fruit and Economic Plant Growers' Association	G. K. Seabrook ...	
Brisbane ...	National Agricultural and Industrial Association of Queensland	H. C. Wood	10, 11, and 12 Aug.
Brisbane ...	Queensland Stockbreeders' and Graziers' Association	F. A. Blackman ...	
Brisbane ...	United Pastoralists' Association	Fredk. Ranson ...	
Bundaberg ...	Bundaberg Horticultural and Industrial Society	H. E. Ashley... ...	
Bundaberg ...	Council of Agriculture	S. A. Lindeman ...	
Bundaberg ...	Woongarra Canegrowers' and Farmers' Association	W. H. Dart	
Burpengary...	Burpengary Farmers' Association	C. H. Ham	
Byrnestown...	Byrnestown Farmers' Progress Association ...	J. Dufficy	
Caboolture ...	Caboolture Farmers' Association	G. Mallet	
Cairns ...	Aloombah Farmers' Association	Chas. R. Spencer ...	
Cairns ...	Cairns Agricultural, Pastoral, and Mining Association	A. J. Draper... ...	28 and 29 Sept.
Cairns ...	Cairns District Coffee Growers' Association...	W. A. Hannam ...	
Cairns ...	Cairns District United Farmers' Association	Wm. Griffin ...	
Cairns ...	Hambledon Planters' Association	E. Whitehouse ...	
Charleville ..	Central Warrego Pastoral and Agricultural Association	A. J. Carter	25 and 26 May

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Charters Towers	Towers Pastoral, Agricultural, and Mining Association	W. Tilley	
Childers ...	Isis Agricultural Association	H. Epps	
Childers ...	Childers Progress Branch, Isis Agricultural Association	N. Rosenlund ...	
Childers ...	Doolbi Mill Branch, Isis Agricultural Association	W. T. H. Job ...	
Childers ...	Childers Mill Branch, Isis Agricultural Association	H. Epps	
Clermont ...	Peak Downs Pastoral, Horticultural, and Agricultural Society	F. Leysley	
Clermont ...	Peak Downs Dairymen and Settlers' Association	A. G. Pursell ...	
Cooktown ...	Cook District Pastoral and Agricultural Society	W. R. Humphreys ...	
Cordalba ...	Cordalba Farmers' Association	B. Goodliffe	
Currajong ...	Currajong Farmers' Progress Association ...	Wm. Howard ...	
Cunnamulla	South Warrego Pastoral Association	J. Winward	
Deception Bay	Deception Bay Farmers' Association	B. J. T. Liscombe ...	
Degilbo ...	Degilbo Farmers' Association	F. A. Griffiths ...	22 and 23 June
Gayndah ...	Gayndah Agricultural and Horticultural Association	J. C. Kerr	
Gin Gin ...	Pastoral and Agricultural Society of Gin Gin	E. K. Wollen ...	
Gladstone ...	Gladstone Pastoral and Agricultural Association	W. J. Manning ...	
Gooburrum, Bundaberg	Gooburrum Farmers' and Canegrowers' Association	W. J. Tutin	
Goondiwindi	MacIntyre River Pastoral and Agricultural Society	A. Gough	
Gympie ...	Agricultural, Mining, and Pastoral Society	F. Vaughan	13 and 14 Sept.
Gympie ...	Chatsworth Farmers' Progress Association ...	William Bellman ...	
Gympie ...	Deep Creek Farmers' Progress Association ...	W. Reid	
Gympie ...	Gympie Horticultural Society	W. G. Ambrose ...	
Gympie ...	The Pie and Eel Creek Farmers' Association	D. J. O'Farrell ...	
Haslemore, Victoria, Herbert Riv.	Herbert River Farmers' League	Alfred Henry ...	
Helidon ...	Helidon Scrub Farmers' Progress Association	M. Morgan	
Herbert River	Halifax Planters' Club	H. G. Faithful ...	
Herbert River	Macnade Farmers' Association...	E. C. Biggs	
Herbert River	Ripple Creek Farmers' Association	J. W. Grimes ...	
Herberton ...	Mining, Pastoral, and Agricultural Association	John M. Hollway ...	3 and 4 April
Hodgson ...	Hodgson Farmers' Association	C. W. Nimmo ...	
Hughenden ...	Hughenden Pastoral and Agricultural Association	W. H. Mulligan ...	8 and 9 May
Ingham ...	Herbert River Farmers' Association	...	
Ingham ...	Herbert River Pastoral and Agricultural Association	P. J. Cochrane ...	15 and 16 Aug.
Ipswich ...	Ipswich and West Moreton Agricultural and Horticultural Society	P. W. Cameron ...	21 Sept.
Ipswich ...	Queensland Pastoral and Agricultural Society	Elias Harding ...	1 and 2 June
Kandanga (near Gympie)	Kandanga Farmers' Association	N. Rasmussen ...	
Kolan ...	Kolan Canegrowers' and Farmers' Association	C. Marks	
Ladeside ...	Mungore Farmers' Association...	J. M. Robinson ...	
Laidley ...	Lockyer Agricultural and Industrial Society	John Fielding ...	26 and 27 July
Loganholme...	Logan Farming and Industrial Association ...	F. W. Peek	
Longreach ...	Longreach Pastoral and Agricultural Society	J. P. Peterson ...	12 April
Lucinda Point	Victoria Farmers' Association	W. S. C. Warren ...	
Luton Vale ...	Mapleton and Dulong Fruitgrowers' and Farmers' Progress Association	E. H. Biggs	
Mackay ...	Agricultural, Pastoral, and Mining Association	F. Black	
Mackay ...	Pioneer River Farmers Association	E. Swayne	28 and 29 June

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Maryborough	Maryborough Horticultural Society	H. A. Jones	
Maryborough	The Island Farmers' Progress Association ...	C. A. Schmidt ...	
Maryborough	Wide Bay and Burnett Pastoral and Agricultural Society	G. Willey	5, 6, and 7 July
Miallo ...	Miallo Progress Association	E. F. Welchman ...	
Milbong ...	Milbong Farmers' Association	T. R. Garrick ...	
Mitchell ...	Mitchell and Maranoa Pastoral, Agricultural, and Vinegrowers' Association	H. J. Corbett ...	
Mosman River	Mosman River Farmers' Association	Geo. W. Muntz ...	
Mount Mee...	Mount Mee Farmers' Association	R. Thomas	
Mount Morgan	Mount Morgan Mining, Agricultural, Poultry, Pastoral, and Horticultural Society	G. Orford	
Mount Morgan	Mount Morgan Agricultural, Pastoral, and Poultry Society	Thos. W. Walker ...	
Mundoo ...	Johnstone River Farmers' Association ...	J. McInnes	
Nerang ...	South Queensland and Border Pastoral and Agricultural Society	W. J. Browne ...	
North Isis ...	North Isis Canegrowers' Association	W. J. Young ...	
Pialba ...	Pialba Farmers' Association	J. B. Stephens ...	
Pickenjennie	Wallumbilla Selectors' League	George Dalziel ...	
Pickenjennie	Pickenjennie Branch, Wallumbilla Selectors' League	George Dalziel ...	
Pinbarren ...	Pinbarren Agricultural and Progress Association	H. Armitage, senr. ...	
Port Douglas	Pastoral, Agricultural, and Mining Association	W. H. Dorrat ...	
Razorback ...	The Razorback Fruitgrowers' Association ...	Ernest E. D'Alton ...	
Rockhampton	Central Queensland Farmers' and Selectors' Association	T. Whitely, Coowonga	
Rockhampton	Central Queensland Pastoral Employers Association	G. Mackay	
Rockhampton	Central Queensland Stockowners' Association	R. R. Dawbarn ...	
Rockhampton	Rockhampton Agricultural Society	R. R. Dawbarn ...	10 and 11 May
Roma ...	Western Queensland Pastoral and Agricultural Association	Angus McPherson ...	25 and 26 July
Roma ...	Yingerbay Farmers' Association	Alex. C. McIntyre ...	
Rosewood ...	Farmers' Club	P. H. Adams... ...	25 Aug.
Springsure ...	Queensland Pastoral Society	G. R. Milliken ...	
Stanthorpe ...	Border Agricultural, Pastoral, and Mining Society	Geo. Simcocks ...	
Stanthorpe ...	Stanthorpe Horticultural and Viticultural Society	R. Hoggan	
St. George ...	Balonne Pastoral and Agricultural Association	T. M. Cummings ...	
Tinana ...	Tinana Fruitgrowers' and Farmers' Association	Chas. Parke	
Toowoomba...	Darling Downs Horticultural Association ...	H. Hopkins	
Toowoomba...	Drayton and Toowoomba Agricultural and Horticultural Society	H. Symes	
Toowoomba...	Royal Agricultural Society of Queensland ...	F. Burtt	1, 2, and 3 Aug.
Townsville ...	Townsville Pastoral, Agricultural, and Industrial Association (formerly North Queensland Pastoral and Agricultural Association)	J. N. Parkes	
Wallumbilla	Wallumbilla Selectors' League	George Dalziel ..	
Warwick ...	Eastern Downs Horticultural and Agricultural Association	J. Selke	31 Jan. & 1 Feb.
Wellington Point	Wellington Point Agricultural, Horticultural, and Industrial Association	F. W. Wort	21 June
Woombye ...	Woombye Fruitgrowers' Association	P. S. Hungerford ...	
Woowoonga	Woowoonga Scrub Farmers' Association ...	H. B. Griffiths ...	
Zillmere ...	Zillmere Horticultural Society	C. McF. Fischer ...	20 Jan.

"THE DISEASES IN PLANTS ACT OF 1896."

Department of Agriculture,
Brisbane, 19th January, 1899.

HIS Excellency the Governor, with the advice of the Executive Council, and in pursuance of the provisions of "*The Diseases in Plants Act of* 1896," has been pleased to make the following further Regulations.

J. V. CHATAWAY.

THE FUMIGATION OF FRUIT FOR EXPORT.

1. Any one who wishes to erect a chamber or building for the fumigating of fruit is requested to give notice to the Under Secretary for Agriculture, who will take steps to see that the chamber or building is properly constructed.

2. When it is required to fumigate fruit for export, twenty-four hours' notice must be given to the said Under Secretary or such other officer as may be duly authorised to accept such notice.

3. The operation of fumigating must be conducted under the control of an officer authorised by the Minister for Agriculture.

4. The fumigating chamber may be made of any convenient size or material, the essential point being that it shall be capable of being closed absolutely airtight, and provided with a flue-pipe in the roof which can be opened or closed to allow of the escape of the gas after fumigation. The flue must be provided with a box or chamber to contain caustic soda or potash to destroy the gas.

The fumigating chamber must be provided with a shutter or sliding panel in the lower portion of the door or wall.

Door, flue, and shutter must all be made to close absolutely airtight.

DIRECTIONS FOR FUMIGATING WITH HYDROCYANIC ACID GAS.

Proportions of Ingredients.—For every 150 cubic feet of room take 1 ounce of cyanide of potassium, 5 fluid ounces sulphuric acid, 10 fluid ounces water.

Having placed the fruit to be fumigated in the chamber, see that the flue and the shutter in the door or lower part of all are properly closed.

The acid is then to be diluted in the following manner:—The whole of the water is placed in a shallow china or glazed earthenware vessel, such as an ordinary wash-hand basin. (Metal vessels are inadvisable unless they are leaden ones.) The sulphuric acid is next poured on to the water in a thin stream, stirring the while with a stick. Do not mix by adding the water to the acid.

The basin containing the acid thus diluted (which should be allowed to cool) is now placed in the fumigating chamber, and the cyanide of potassium is emptied into it.

The gas is given off with great violence, and the door should be immediately closed.

The whole is now to be left to itself for one hour. At the end of this time the shutters in the flue and in the door are opened, and the draught produced drives the gas out of the chamber. At the end of half an hour the door is thrown open, and if the draught has been effective there should be hardly any trace of hydrocyanic gas recognisable. The chamber may be left in this condition for another ten minutes or a quarter of an hour. The fruit is now to be moved and allowed to remain in a well ventilated place, preferably out of doors, for another half an hour. Samples of fruit will be examined from time to time by the entomologist.

Caution.—As hydrocyanic acid gas is most deadly in its effects on animal life, the greatest care must be taken in its use.

Department of Agriculture,
Brisbane, , 18

This is to certify that has treated cases of citrus fruit with hydrocyanic acid gas for one hour, under my supervision. These cases have been branded "Crown" over "Passed."

Shipping marks:
Per S.S.:
Consigned to:

Department of Agriculture,
Brisbane, 26th January, 1899.

THE following Proclamation by His Excellency the Governor of New South Wales is published for general information.

J. V. CHATAWAY.

NEW SOUTH WALES, to wit.
(L.S.)
HAMPDEN, *Governor.*

PROCLAMATION.

By His Excellency The Right Honourable HENRY ROBERT, VISCOUNT HAMPDEN, Governor and Commander-in-Chief of the Colony of New South Wales and its Dependencies.

WHEREAS the Governor is empowered by Section 9 of the "Vegetation Diseases Act, 1897," from time to time, by Proclamation in the *Gazette*, to declare any fungus or vegetable parasite whatever to be a fungus within the meaning of the said Act: Now, therefore, I, HENRY ROBERT VISCOUNT HAMPDEN, the Governor aforesaid, with the advice of the Executive Council, do by this my Proclamation, declare Black Spot (*Fusicladium*) to be a fungus within the meaning of the said Act.

Given under my Hand and Seal, at Government House, Sydney, this twenty-second day of December, in the year of our Lord one thousand eight hundred and ninety-eight, and in the sixty-second year of Her Majesty's reign.

By His Excellency's Command,

JOSEPH COOK.

GOD SAVE THE QUEEN!

Department of Agriculture,
Brisbane, 25th May, 1899.

HIS Excellency the Governor, with the advice of the Executive Council, has, in pursuance of the provisions of "*The Slaughtering Act of* 1898," been pleased to make the following Regulations.

J. V. CHATAWAY.

REGULATIONS UNDER "THE SLAUGHTERING ACT OF 1898."

Definitions.

1. Save as herein otherwise provided, in these Regulations the terms used have the meanings respectively assigned to them by "*The Slaughtering Act of* 1898."

The term "Stock" means and includes cattle, sheep, and swine;

The term "Licensing Court" means a Police Magistrate or if he is absent or there is no Police Magistrate, then any two justices sitting in a Court of Petty Sessions having jurisdiction in the district within which a slaughter-house is or is proposed to be established;

The term "Inspector" means the inspector (if any) to whom a district is assigned, or if he is absent, or there is no such inspector then any inspector appointed under the provisions of "*The Slaughtering Act of* 1898";

The term "Owner of stock" means the owner whether jointly or severally of the stock, or the authorised agent or superintendent of the owner, or the drover or person in charge of the stock.

Unlicensed slaughter-house.

2. Any person who establishes or keeps an unlicensed slaughter-house is guilty of an offence against these Regulations.

Illegal slaughter.

3. No person shall slaughter at any place other than at a licensed slaughter-house any stock the flesh of which is intended to be used for meat.

Licensing Court.

4. Subject to these Regulations, the Licensing Court may license slaughter-houses established or proposed to be established within a district.

Application.

5. Every person who desires to obtain a license or the renewal of a license for a slaughter-house shall make an application therefor in writing in the form in the First Schedule hereto or to the like effect.

Time for applying.

6. Every application shall be addressed to the Licensing Court of the district within which the slaughter-house is or is proposed to be established, shall be lodged with the proper Clerk of Petty Sessions, and shall be accompanied by the license fee hereinafter prescribed. Applications for licenses shall be so lodged on or before the fourteenth day of December, March, June, and September in each year. Applications for the renewal of licenses shall be so lodged on or before the fourteenth day of December in each year.

Duty of clerk of petty sessions.

7. Upon the receipt of every such application, the clerk of petty sessions shall forthwith forward a copy of the same to the local authority of the district and also to the inspector.

Representatives of local authority.

8. The local authority of the district may make to the Licensing Court such representations, in writing or otherwise, with respect to every such application, as the local authority thinks fit.

Report of inspector.

9. It shall be the duty of the inspector, upon the receipt of every such copy of an application, to inspect the premises in respect of which a license or the renewal of a license is applied for, and to report thereon to the Licensing Court. He shall either make such report in writing under his hand, or, if directed so to do by the chief inspector, shall personally attend at the sittings of the Licensing Court, and there orally report to the Court upon the same.

The hearing.

10. The Licensing Court shall sit for the hearing and determination of all applications for licenses on the first Tuesday in the months of January, April, July, and October in every year.

The Licensing Court shall sit for the hearing and determination of all applications for the renewal of licenses on the first Tuesday in the month of January in every year.

After considering the report of the inspector and the representations, if any, of the local authority of the district, the Court may, subject to these Regulations—

(1) Grant the application; or
(2) Adjourn the application for the purpose of the execution by the applicant of such works as in the opinion of the Licensing Court are necessary to render the premises suitable and proper for the slaughter of stock; or
(3) Refuse the application.

Duration of license.

11. Save as hereinafter provided, a license for a slaughter-house shall remain in force for the period of one year, but may from time to time be renewed for a like period. Provided that a new license granted for a slaughter-house shall only remain in force until the sitting of the Licensing Court held in the month of January following the date on which such license was granted. Provided further that all existing licenses shall remain in force until the sitting of the Licensing Court held in the month of January next.

Fees for licenses.

12. The annual fee payable in respect of the license or the renewal of the license of a slaughter-house shall be twenty shillings.

Fees for defraying expenses.

13. The fees payable by the licensee of a slaughter-house for the purpose of defraying the expenses of inspection shall be as follows, that is to say:—

	s.	d.
For every bullock, steer, cow, or heifer slaughtered ...	0	3
For every 12 sheep or calves slaughtered	0	3
For every head of swine slaughtered	0	3

Such fees shall be paid by the licensee to the inspector monthly, or at such shorter intervals as the inspector may require.

Receipt.

14. The inspector shall, upon the payment of such fees, give to the licensee a receipt under his hand in the form of the Second Schedule hereto.

Delivery note.

15. When stock are delivered at a slaughter-house to be slaughtered, the owner of the stock shall deliver to the owner of the slaughter-house a way bill or delivery note of the stock, setting forth the number, the description, and the brands or marks of the stock, and signed by the owner thereof.

The owner of the slaughter-house shall retain and preserve every such way bill or delivery note, and shall, on demand, produce the same to the inspector.

Slaughtering book.

16. The licensee of every slaughter-house shall keep a book called a "Slaughtering Book," in which shall be correctly recorded all the particulars set out in the Third Schedule hereto; and such book shall be open at all reasonable times to the inspection of any inspector, or any inspector of brands or police officer, who may make any copy of or extract therefrom.

Floors.

17. The floor of every place in a slaughter-house where stock are pithed or slaughtered, or where meat is dressed, prepared, treated, or stored, shall, if required by the inspector, be constructed of concrete or otherwise rendered impervious, to his satisfaction.

Drainage; ventilation.

18. Every slaughter-house shall be drained and ventilated to the satisfaction of the Inspector.

Blood.

19. In every slaughter-house all blood shall be boiled, desiccated, or otherwise treated to the satisfaction of the Inspector.

Privies.

20. Every water-closet, privy, cesspool, and urinal used in connection with a slaughter-house shall be situated at a distance of not less than one hundred yards from any building, enclosure, or place in or at which stock are slaughtered or meat is dressed, prepared, treated, or stored.

Pigsties.

21. Every pigsty, enclosure, and place where swine are kept at a slaughter-house shall be situated at a distance of not less than two hundred and fifty yards from any building, enclosure, or place in or at which stock are slaughtered or meat is dressed, prepared, treated, or stored.

Offal to swine.

22. Swine shall not be fed with offal at a slaughter-house, nor shall any offal be removed therefrom for the purpose of feeding swine, unless such offal has first been thoroughly cooked.

Notice of slaughtering.

23. The owner of every slaughter-house shall give to the inspector such notice of his intention to slaughter stock as will enable the inspector to inspect such stock.

Tampering with meat.

24. Until stock slaughtered have been inspected by the inspector the pleuræ are not to be stripped or otherwise interfered with, and no part of the carcass is to be cut away, manipulated, or interfered with in any manner which may prevent the discovery of disease or may alter the true condition of the meat.

The inspector may condemn any stock or meat which in his opinion has been dealt with in contravention of the provisions of this Regulation.

Branding meat.

25. When the inspector has inspected any meat and approved of the same, he shall brand each separate quarter of beef and each carcass or quarter of mutton with a mark or stamp.

Any person who wilfully removes or obliterates any such mark or stamp, or who, not being an inspector, affixes or causes to be affixed to any meat any such mark or stamp, is guilty of an offence against these Regulations.

Calves.

26. Calves less than four weeks old are not to be slaughtered for meat.

Condemned meat.

27. Condemned meat at a slaughter-house shall be rendered unfit for the food of man in the mode directed by the inspector.

Removal of hides, &c.

28. Offal and the hides, skins, heads, and feet of stock slaughtered at a slaughter-house shall only be removed from the premises in the manner and at the times directed by the inspector.

The contents of paunches and of intestines shall be deposited in the place appointed by the inspector for the purpose.

Carriage of meat.

29. Meat shall be carried from the slaughter-house to the butcher's shop in vehicles approved by the inspector.

Every such vehicle shall be provided with a proper roof, and shall be so constructed as to permit of a free current of air.

Meat shall be carried in such vehicle either suspended from the roof or sides thereof, or so arranged that a free current of air may circulate between the carcasses or portions of carcasses being carried.

Blowing meat, &c.

30. No person shall blow with his breath or otherwise into any meat, or eject any salt, liquid matter, or other substance from his mouth thereon.

No person shall treat, dress, or prepare any meat by means of any preservative or other substance which, in the opinion of the inspector, injures, or is likely to injure, such meat or to render it unfit for the food of man.

Offences.

31. Any person who contravenes any of the provisions of these Regulations is guilty of an offence, and is liable to a penalty not exceeding fifty pounds.

When a licensee of a slaughter-house, having been convicted of an offence against "*The Slaughtering Act of* 1898" or these Regulations, is on a second or subsequent occasion convicted of an offence against such Act or Regulations, the Court, by or before whom he is so convicted as last aforesaid, may, in addition to the punishment for such offence, order the license of the slaughter-house to be suspended for such time as the Court thinks fit, or to be absolutely cancelled, and such license shall be so suspended or cancelled accordingly.

FIRST SCHEDULE.

APPLICATION FOR A LICENSE OR THE RENEWAL OF A LICENSE OF A SLAUGHTER-HOUSE.

"*The Slaughtering Act of* 1898."

To the Licensing Court for the District of [*name of District*].

I [*or* we] hereby apply to the Licensing Court to be holden for the district of [*name of district*] for a license [*or* the renewal of a license] of a slaughter-house proposed to be established [*or* established] at [*describe locality so as to clearly identify it*].

Dated at the day of

Applicant.

SECOND SCHEDULE.

RECEIPT.

"*The Slaughtering Act of* 1898."

I have this day received from [*name of licensee or licensees*] the sum of £ , being fees in respect of stock slaughtered at the slaughter-house at [*situation of slaughter-house*], whereof he is the licensee [*or* they are the licensees], between the day of and the day of .

The particulars of the stock are as follow:—

Cattle [*insert number*]

Sheep and Calves [*insert number*]

Swine [*insert number*]

Dated at the day of

Inspector.

THIRD SCHEDULE.

SLAUGHTERING BOOK.

Date of Slaughtering.	Number of Stock Slaughtered.			Person from whom Stock obtained.	Brands or Marks.
	Cattle.	Sheep.	Swine.		

REGULATIONS UNDER "THE SLAUGHTERING ACT OF 1898."

Department of Agriculture,
Brisbane, 15th November, 1899.

HIS Excellency the Lieutenant-Governor, with the advice of the Executive Council, has, in pursuance of the provisions of "*The Slaughtering Act of* 1898," been pleased to make the following additional Regulation.

J. V. CHATAWAY.

32. Clause 12 of the Regulations under "*The Slaughtering Act of* 1898," dated the twenty-fifth day of May, 1899, and published in the *Government Gazette* dated the twenty-seventh day of May, 1899, is amended by the addition of the following paragraph:—

Provided that the annual fee payable in respect of such license or renewal of such license issued to persons who only slaughter calves and pigs, but not exceeding five head in all in any week, shall be two shillings and sixpence.

By Authority: EDMUND GREGORY, Government Printer, William street, Brisbane.

Agriculture.

THE MANAGEMENT OF PASTURE LANDS.

By S. C. VOLLER,
Department of Agriculture.

If there is one thing certain above others in connection with our grazing interests in this colony, it is that we do not get, as a rule, anything like full advantage from our pastures.

I allow at once that there are some pleasing exceptions to be met with here and there, but they only prove the rule. How many dairy farms, how many grazing areas, out of the many thousands of acres which are devoted to such purposes, are really giving the results in grass which they ought to do? How many paddocks will a man meet in a day's ride through our closely settled districts, which can be said to be a delight to the eye of the onlooker, as well as a delight to the stock running there? Is it not true that one has only to keep his eyes open while going on a railway trip, to see a striking contrast between the growth of grass inside the railway fences and that outside; and the poor unfortunate stock in many places pegging away at the almost bare ground for a feed, and giving now and then wistful looks at the tempting stuff they cannot get at? I fancy I hear some of my readers exclaim: "Oh, yes; but that's simply because the railway line is shut up, and the cattle kept out. Anybody can see that!" Well, my friends, I am glad if *you* can see that, because if you can, you can go on and see a little more. I am afraid there are a good many who do not see it, or, at least, never think what it points to. Is there not a big object lesson in the fine growth of grass inside our railway enclosures? Is there nothing to learn in the wretched fact that in the majority of paddocks, there is no grass worth talking about, and that in a great many districts, both quality and quantity are rapidly getting less, until it has become a common thing for folks to talk about "the good old days" when the grass was grass, and cows used to milk, and bullocks fatten as they no longer do now? Is there nothing in the fact that the quality of the feed has completely altered in many parts of the country and altered for the worse, and is still altering for the worse? Inferior sorts of grass are the only ones now to be found on much country that used to carry high-class varieties. Why is this? Simply because the majority of our farmers and graziers have never taken care of their country, but have, instead, gone the right way to work to spoil it, and are still working out their own destruction. Overstocking, promiscuous feeding, and the utter absence of system in grazing are at the bottom of the trouble. For years stock have been kept rambling and feeding over the same land, sometimes in too great numbers and naturally, when stock feed, they pick the best and the tastiest grass and leave the less palatable, and they keep on always doing this. What is the result? The best varieties never get a chance to go to seed or even to keep up a decent growth, while the worst and the most useless are the ones that are left to seed, becoming as a consequence the principal occupants of the soil. A moment's thought on this point will make the matter quite clear, and bring up in the mind of the reader an idea of the importance of the thing, for it is important. It makes a vast difference to decent country to allow it to deteriorate in this way. The carrying capacity is seriously lowered, fattening becomes almost an impossibility, while the milk-producing power, where dairying is followed, gets down almost to vanishing point.

Take any number of our dairy farms—what is their grass worth in results? Just about nothing. And if it is worth anything, in nine cases out of ten it is only for a very short time, as it simply gets no chance to grow. The everlasting chewing down that the grass gets in many places knocks all the heart out of it. It cannot bear up against the constant attack, and Nature gets disgusted because proper growth and development are never allowed. But this is not the fault of the country or of the grass. It is the fault of the owner. Things really, in most cases, should never have come to this, and, if the cause of it all is wanted, I should say at once that it is want of management, or, as I have already remarked, the utter absence of system. And the remedy, where things have got so far, and the preventive where they have not yet gone down hill, is to be found in systematic working and feeding of dairy farms and grazing paddocks.

It is possible to increase the carrying capacity of your farm and paddocks to an extent that is really surprising. Many people would hardly credit what can be done under careful, intelligent management. In subdivision and feeding paddocks off in rotation lies the secret of the business. Split up your farm or grazing country into as many paddocks as you possibly can, taking water into consideration, of course, and in the case of, say, a dairy herd, put your milkers into one for a week or a fortnight, and shut all the others up, and watch the results. Before long you will find yourself getting very pleased over it; and why? Because your cows will rapidly improve in condition, and in yield of milk and butter, and they will improve because your grass is improving, as it must do. Just reckon it up now for a moment. A man subdivides until he has, say, five handy paddocks. He puts his cows into No. 1 for a fortnight, and the other four have a fortnight's spell. He goes on with No. 2, and three of the others get a month's spell, while No. 1 gets a fortnight. Now follow this round, and for one fortnight's feeding each paddock gets eight weeks' spell. What will be the result of this? Well, all your grass is fed off evenly, and when the paddock is shut up, it all grows evenly. It all has an equal chance—no cows coming along every hour of the day to tear off a bunch of good grass as soon as it puts its head above ground, and leave the worse ones to grow ahead of it; but an even growth, and for eight weeks without being disturbed! And how it will grow in that time if the land is good, and the rain comes at the right time! And won't the cows enjoy it when they keep on getting into these fresh well-saved paddocks! And won't your milk supply increase, and your credit at the factory mount up! Yes! and in a short time it will be found that the same country is growing four times as much grass and carrying four times as many cattle. More than that—your grass will improve in quality. The old good sorts, which you have deliberately fed out in many parts, will come back again and take their proper place in your pastures, and the bad sorts will no longer have complete possession.

This system can be successfully applied to small farms as well as to large ones, or to big grazing areas. In fact, it is one of the conditions of success, and I think it is quite time our farmers, in particular, gave careful attention to this line of work. I know perfectly well that this sort of thing cannot be done all at once, because the necessary fencing costs money, and means labour, and many of our farmers cannot afford too heavy expenditure; but there is no reason why a man should not begin now, and, being quite clear in his own mind what he is driving at, keep steadily on, doing a bit whenever opportunity offers, or as he can afford it, until he accomplishes his object. We may be sure of one thing—it will pay. It means getting the best possible results from your land acre by acre, instead of holding so much and getting little or nothing off it. It means that even in a bad season your grass will last longer and go farther, because it will not be tramped over and over, and because it will be able to take advantage of any passing favourable change that may occur. A proof of this can be seen in the way farm headlands and odd corners that are enclosed often brighten up if only with a short spurt, and put on a growth which the paddocks do not show at all, but which would mean a great deal if it could be obtained outside. By the system above explained, one can get this result in the paddocks.

Further, it means a big gain in your stock; less of the starvation and poverty that too often makes the life of our average dairy-farm cow one prolonged misery, and which frequently shortens it by years, and which is a standing disgrace to many of our so-called farmers. Why should stock in any ordinary season take half the summer to recover from the effects of the previous winter? We see this only too often; in fact, in many parts it is the usual thing. Is it not because, first, there is little or no provision made for housing and feeding in the winter? and, secondly, because there is no proper management of the pastures so as to make sure of the grass, as I have suggested? It is not my purpose in this article to deal with the question of handfeeding, but I want to say this—that if the systematic working of grazing paddocks is backed up by sensible housing and feeding in the winter season, those who follow it up will be surprised to find what good results they will obtain.

THE BUTTER BEAN (*PHASEOLUS VULGARIS, VAR. AUREA*).

By WILLIAM FRENCH,
Queensland Agricultural College.

This variety I consider one of the very best dwarf beans for summer sowing, as it stands the heat and drought better than any of the other varieties.

The ground should be ploughed to a depth of, say, 8 or 9 inches, and be well broken down with the roller and harrow, and if not in good tilth it is well to give a second ploughing, harrowing, and again roll, as it will well repay the time spent on getting it into good order. To bear this out one need only take a walk around the district and compare the well tilled with the badly tilled land, and note the difference in the crops—luxuriant growth on one side of the fence and the reverse on the other, although the soil is practically the same, the different result being simply owing to good and bad cultivation.

In sowing Butter Beans, measure off the ground in rows 3 feet apart, so as to allow the scuffle room to work. Drop the seeds at distances of from 4 to 6 inches in the rows, as they do better without crowding. If the seeds be fresh and good and the weather favourable, they will be up in less than a week.

If the Planet Junior is available, sow with it, as it will save a great deal of time; but failing it, stretch a line to keep everything straight, as nothing looks more unworkmanlike than a field of plants out of line. Draw a drill with the chipping hoe along the line about 3 inches deep, and let one boy follow to drop the seeds and another to cover them in. With the ground in good order you can go along at a fair walking pace, and can quickly sow half-an-acre of land, which area will require about three quarts of beans, the Butter Bean being only about half the size of some of the ordinary varieties such as Canadian Wonder.

With anything like fair weather you should have some beans fit for picking in about sixty days,* and you have a splendid bean for the table, with, practically speaking, no fibre whatever, so that they can be cooked whole or sliced up without the labour of stringing.

BACKWARD IN MAIZE-HARVESTING.

Mr. Geo. Valder, Principal of the Hawkesbury Agricultural College, in a paper in the N.S.W. *Agricultural Gazette*, says:—

It is to be hoped that the farmers, in the maize-growing districts, will give more attention this season to improved maize-harvesting machinery. I believe that in this colony we are more backward in our system of maize-harvesting than in any other maize-growing country. Queensland farmers are

*Sixty days appears to be rather a long time before the plants begin to bear. We sowed Butter or Stringless Beans on the 11th November; they appeared above ground on the 19th November, and on the 19th December a peck was gathered, and they are now bearing heavily and being picked every day.—Ed. *Q.A.J.*

turning their attention to the use of the corn-harvester, and they have made a decided advance in threshing, as the following extract from a paper read by Mr. W. D. Lamb, of Yangan, Darling Downs, will show:—"Harvesting is done by pulling off the cobs from the stalk, with the husk on, and throwing them into convenient heaps, when a dray or wagon comes along and carts them to the shed, or more commonly into a heap in or near the field. Then the thresher comes along in the shape of a machine that is capable of husking, shelling, cleaning, and bagging ready for market up to 1,200 bushels per day. The machine is drawn by a traction engine, which also drives it when at work. The engine draws the machine into its place, and then backs off to its place behind the thresher; the belt is put on an elevator running out to the heap to haul up the cobs, and there is also one to stack the husk and cob. Three men with iron scoops take their position at the heap, and two men at the bags. The whistle is sounded, the engine starts, and down comes the clean maize into the bags at the rate of 100 bushels per hour. Nineteen-twentieths of the maize on the Southern Downs is now threshed by this kind of machine, as it is so much cheaper than the old method. The total cost of threshing to the farmer is now 1½d. per bushel, as against 6d. to 8d. by the old method."

THE ONION.

DURING this month some market gardeners will be sowing for an onion crop, although we prefer to sow in April, as much weeding is then avoided. We have already in previous numbers of this *Journal* written on the treatment of this vegetable from the seed bed to the market, but for the benefit of those who have not these articles at hand we give the following notes:—

The most suitable soil is a rich, light loam. It cannot be too rich. It must be free, friable, and easy to work, must not cake, must be well-drained, and, if possible, should overlie a subsoil of gravel. Before sowing dig the ground or plough it to a depth of from 15 to 18 inches. Then harrow well, roll down all the clods, and leave it for, say, a month. This gives the weed seeds time to germinate and come up. When these weeds have come up, go over the ground with a horse-hoe and rake it to a depth of 6 inches; harrow down level, work the ground to the very finest tilth, and then roll it to ensure getting a firm bed. A good dusting of wood ashes before the final scuffling will keep the onions from decaying at the roots before they begin to ripen. The seed may be sown broadcast or may be drilled in, or may be sown in a seed-bed and afterwards planted out. The beds should not be more than 6 feet wide, as this allows of cleaning without treading on the plants. If the seed is drilled in, it will require about 2 lb. of seed per acre, the seeds being dropped 2 inches apart in the drill. (In planting out, each plant should be 6 inches apart.) The drills should be slightly raised and be from 12 inches to 15 inches apart from each other, never less than 10 inches; this will allow of a Dutch hoe being used between the onions to keep them clean.

Do not cover the seeds too deep; a slight covering of soil is quite sufficient. If sown deep, many seeds will fail to germinate, and most of those that do appear will make an abnormal growth of neck. In from 9 to 20 days the young plants will appear above ground, and the rows can be followed. Now keep the hoe constantly going, for the onion will not thrive any more than any other plant when choked with weeds. If any soil is heaped against the plant during hoeing, it must be carefully raked back, so that only the root is left in the ground. If this is not attended to, the result will be a plant more resembling a leek than an onion. For this reason the land is solidified before planting, by rolling, to allow of the bulb squatting on the ground instead of in it.

Onions may be known to be ripe by the drying up of the tops. When this happens, take them up and lay them on the ground between the rows to dry. Then carry them carefully to the barn with as little bruising as possible.

The best onion to grow is the Brown Spanish; but on the North Coast lands, the Extra Early Barletta and Early Flat Red appear to be best adapted for the soil and climate. The yield from well-tilled land averages about 10 tons per acre, but there are many instances of from 12 to 15 tons having been harvested. It is a crop that will repay the farmer for his trouble, and one that always meets with a ready sale.

PROSPECTS FOR FROZEN MEAT.

The Hon. J. Archibald, M.L.C., who returned from Europe in December last, speaking of the meat trade in London, said:—While in England, I made inquiries into the future prospects of the home markets for our surplus cattle and sheep, both frozen and tinned. At the time of my visit the demand was strong and the prospects bright. I learned that a large number of the ranches in America are being gradually absorbed for agricultural purposes, and the day is not far distant when, owing to the increase in population in America and the smaller area on which to grow sheep and cattle, the English markets will be wholly supplied from the Australian colonies. What is really wanted in connection with the frozen meat trade is one large distributing department, to overtake the supply and sale of our beef and mutton throughout the United Kingdom. In many places I visited, the meat from these colonies is sold indiscriminately, with the result that we do not realise fair prices for our commodity.

SILAGE *v.* ROOTS.

At the Ontario Agricultural College, Shaw fed to three groups of steers about 12 lb. of grain daily per head, consisting of ground peas, barley, and oats. The roughage fed the different lots was as follows:—Lot 1, 57 lb. of silage per head daily. Lot 2, 31 lb. of silage and 9 lb. of hay per head daily. Lot 3, 43 lb. of roots and 11 lb. of hay per head daily. The trial began in December and lasted 146 days, with the results shown in the following table:—

	Lot 1. Silage and Meal.	Lot 2. Silage, Hay, and Meal.	Lot 3. Roots, Hay, and Meal.
	lb.	lb.	lb.
Weight of two steers at commencement ...	2,789	2,735	2,672
Gain of two steers in 146 days	555	448	537
Average gain per steer	277	224	268
Average gain per steer per day	1·90	1·58	1·84

It will be seen that the steers getting silage only with grain, made a greater daily gain than those getting roots, hay, and grain, or even silage, hay, and grain. Stockmen in this country have always admired the highly finished cattle of Canada and especially those of Great Britain, both of which countries make extensive use of roots for steer-feeding. Our feeders have always affirmed, however, that, no matter how desirable roots were for feeding purposes, they were out of the question, because our people have neither the time nor inclination to grow root crops. Our experiment stations have shown that an acre of corn silage is even more valuable in nutrients than an equal area planted to roots, and that the corn crop can be placed in the silo for half the cost of placing the same area of roots in the cellar. If silage is as valuable as roots, pound for pound, for fattening steers, and if a given weight of this material costs but half as much as roots, cannot the corngrower use silage satisfactorily for both growing and fattening cattle?

WHEAT-GROWING AT LONGERENONG.

The Longerenong Agricultural College, after having been somewhat of a white elephant for a time, has wakened up, and some valuable wheat experiments are now being conducted there under the eye of the manager, Mr. Niven. About 50 varieties have been grown. The results for the past two years would give the preference to the following varieties as the best for the Wimmera:—Allora Spring, Talavera, Hudson's Purple Straw, Steinwedel, Quartz, King's Jubilee, Zealand Basthoud, Sullivan's Early, and Queen's Jubilee. The last-named is one of the most prolific wheats grown, and has held the best record for the last two seasons. The experiments carried out by Mr. D. McAlpine, Government Pathologist, with respect to smut and rust, have also been successful. Badly smutted wheat was sown in May last, and subjected to different treatments, some with bluestone and cold water, and some with bluestone and hot water. Smutty seed untreated all showed smut. Purple straw, which had been treated with hot water at a temperature of 130 degrees for six hours, grew without smut, but some of the heads were weak and irregular. Queen's Jubilee badly smutted seed, treated with bluestone before planting, showed only one head of smut. Mr. Niven's opinion is that the smut exists in the seed, and lives with the life of the plant from the time of its sowing. The untreated smutty Purple Straw variety, sown and grown alongside the Queen's Jubilee, did not infect the latter, proving, Mr. Niven contends, that smut is not infectious, and must come from the seed.—*Farm and Dairy.*

THE GOOD OLD DAYS AND NOW.

It is surprising how fond the good old farmers (and indeed many old people who are not farmers) are of sighing for the "good old days." The fact is that the good old days were very hard old days, and the enchantment of the retrospect is only lent by distance. It has been said that we never exhibit a grain of humour in our articles in this *Journal*. Why should we? The *Journal* is intended for the dissemination of instruction amongst the farming community, and we have reason to believe that it has amply fulfilled its destiny. However, we find in the *South Australian Journal of Agriculture* a humorous paper which carries a deal of truth and common sense in it, and we print it with a recommendation to the grumblers to read, mark, learn, and be content with the goods the gods of the present day send them.

The following shrewd, though very humorous, remarks were made by Mr. Peter Allen at a conference of Northern Yorke's Peninsula Branches of the Agricultural Bureau, held at Port Broughton in April, 1899:—

The cultivation of the soil is the most ancient, the most honourable, and the most indispensable occupation of man. The first man of whom we have any record was engaged in this work, and from then right down through the ages there have always been tillers of the soil, and they have ever been, as now, the mainstay of the nations, and must continue so till the crack of doom, for only by the produce of the earth, procured by its cultivation, can life be sustained on this terrestrial ball. But old and tried as the occupation is, it is yet but very imperfectly understood, except of course by those who have never tried it! The method and means of cultivation were simple and hard from the very beginning, and age after age the farmers seem to have worried along in the same old groove, apparently satisfied that the system or want of system followed by their fore or five fathers was good enough for them. It is only within the past few years that scientific men have turned their attention to farming, and have thereby largely assisted in bringing it to its present state of imperfection.

Probably more progress and improvement has been made in the method and means of cultivation during the past 50 years than in all the preceding centuries. Experimental farms are now maintained by the State as object lessons, where professors who have made a life study of agriculture are

employed to teach men to farm aright, while Agricultural Bureaus, composed of level-headed practical men, are disseminating knowledge and information broadcast throughout the length and breadth of the land, and manufacturers by inventive genius and skill are doing all in their power to reduce the cost of labour, simplify the working, and thereby increase the profits of the farm. The present-day farmer has knowledge and appliances at his disposal never even dreamt of in the philosophy of his father. And yet how often do we hear men—particularly the pioneers—harking regretfully back to the "good old days of yore"—the infant days of the colony. What glorious times they then enjoyed—how sweet the memory still! In fact, we have actually heard envious reference made to Adam, who is said to have been the first farmer, and as such enjoyed privileges and position never since equalled by mortal man. But what are the actual facts of the case? We have lately been hunting up the records, and find that this Adams—or, as he in our day would be called, Mr. Adams—began life as a gardener, but by some mismanagement, the blame of which he tried to put off on his wife, lost his situation, and, not having been brought up to any trade or profession, was unable to obtain other employment, and probably having a little means of his own he decided to invest it in farming, as many a man has since done to his sorrow. We have no details as to his method of working. He does not appear to have kept a diary, a rain gauge, or a bike, belonged to no agricultural or show society, wrote no letters to the papers, and does not seem to have been a member of any bureau; consequently we are unable to say whether he was more successful with his farm than he had been with the garden. True, he had unlimited scope of country on which to work, and could extend his holding without let or hindrance. He was not hampered by complicated land laws, was free from land tax and water rates, never had his books or banking account overhauled by suspicious income tax collectors, was not compelled by the district council to contribute towards the construction and maintenance of roads, had no exorbitant railway charges to pay, but could dictate his own price and terms for wheat, and was in fact at one time in a position to corner the markets of the world.

But with all this, we do not learn that he made enough to retire on, for he had not the assistance of improved machinery. The stump-jumping plough was unknown in his day, likewise the stripper and twinebinder. He does not appear to have used seed drills or fertilisers, put his crop in as best he could, took it off in the same way, and instead of using Bagshaw's winnower and bagger probably had to do his wheat-cleaning with his hat and the wind. No; every advantage has its disadvantage, and as to the good old days of the colony, so often referred to, in what respect were they so much better than now? True, magnificent crops were grown, but what did it all amount to? A few acres only, cultivated with considerable labour, pain, and sorrow. The implements then in use were crude and ancient in design, and largely assisted in making wheat-growing a slow, laborious, and distasteful undertaking. In these happy wayback days horses were few and far between. The chief motive power on or off the farm was bullock power. If a man was out on business he would probably take the whole team with him; if on pleasure, two yoke of oxen and the dray; but if in a hurry, then he would walk. The old swing plough of one furrow was then the speediest known method of breaking up land; consequently the area under crop was never very great, which was probably a fortunate thing, as the method of harvesting was even worse than the putting in. The reap hook and scythe, worked of course by man power, were the principal factors in taking off the crop. After the cutting—which included fingers, legs, &c.—the wheat was tied in sheaves, set in stooks, or carted into stacks to await the threshing operation; and this same threshing was no vain undertaking. The sheaves were strewed around in a circle, and a long string of bullocks yoked and chained was run round and round over it to knock it about with their feet. This they generally succeeded so well in doing that by the time they were hauled off they had scattered the wheat over nearly twice as much ground as it was grown on. If the threshing was not

performed by bullock power, it had to be done with a villainous-looking contrivance called a flail. This weapon consisted of two 5-feet sticks fixed endways together by a piece of greenhide, rope, or wire. The operator held on to one stick and swung the other wildly around his head in a manner calculated to endanger his own life or that of anyone within a chain of him. At intervals the revolving stick would be brought down with a sounding whack on an unoffending sheaf or anything else within reach. Sometimes when the machinery was in full swing the coupling strap would break and the farthermost stick would soar off with a velocity that meant death or destruction to anything that obstructed its onward flight. If the threshing were being done in a barn, the escaping missile usually went out through the roof, but if in the open air then the Lord only knew where it went. Another method of threshing was to lay down a log and batter the sheaves on that till the grain was all knocked out of the ears and almost out of sight.

After messing and battering the grain about with cattle and sticks till it was pretty well the colour of the earth from whence it came, what could be found of it would be scraped into heaps, and then it was no easy thing to separate stones, earth, and chaff from the wheat. Winnowing machines were few and far apart, slow to work, plenteous in noise, and of a description that would not now be allowed or tolerated in the harvest field. When the cleaning had been accomplished it was not always an easy matter to get the wheat to market. The roads were long and not as good as they might have been, and railways were scarcely thought of.

The prices then obtained were not more satisfactory than now, for, there being no cable communication with lands across the sea, the farmer did not always feel satisfied that he was getting the full value for his wheat. If offered 15s. a bushel he thought he ought to have 20s., and so he really ought, for it was well worth that amount to grow it as he had to do.

In those oft-regretted days the weather was supposed to have been under Divine control, and not regulated by barometers and meteorologists; the seasons are said to have been less variable than now. More rain and wetter, sunshine more shiny, louder thunder, forkeder lightning, warmer frosts, bluer moonlight, bigger stars, higher whirlwinds, more Sundays, and no red rust, takeall, alien hawkers, insurance agents, or tax collectors. Yes; these were the good old days that we so often hear about! But as settlement increased district councils were formed, roads made, bridges built, and railways extended throughout the length and breadth of the land. Travelling was made easy, postal arrangements greatly improved, and modern appliances everywhere brought into use. Horses took the place of bullocks, the old wooden plough and harrow made way for lighter, speedier, and more effective implements. The scythe and reap hook disappeared before the mower and stripper. Labour-saving machinery was introduced wherever practicable, and so men's knowledge and opportunities increased; so also did their requirements. Larger areas were brought under cultivation, and larger returns secured, but never large enough to satisfy expectations or requirements. What satisfied men a few years ago would be considered positive hardship now. But 'twas ever thus: the more we have the more we want, and the more we know the more dissatisfied we become. Who now would really like to go back to those old works and ways, especially on a farm? What sort of a figure would the old-time farmer cut in these days of keen competition, low prices, and bad seasons? The cost of labour alone would be more than he could produce. In the sweet gone-by it would have taken about 16 men and boys, 48 bullocks, and eight ploughs to turn over as much land in a day as can now be done by one stout lad with six horses and a six-furrow plough. The same lad with three horses and a stripper will take off as much crop in a day as could be done by about 40 stalwart reaphook men; while three men with the latest improved winnower would clean as much wheat in one day as six old-timers with two of their hurdy-gurdies could do in a week. Then look at the convenience and facilities for getting produce to market. Instead of being a week or more on

the road—and a bad road at that—now in most cases a day's journey will land the farmer and his wheat at the railway, where he may speedily be relieved of all further responsibility concerning it.

Even in selling wheat we have post and telegraphic advantages unknown to the ancients. In the olden times there would often be a difference of two or three pence per bushel in the prices offered by the different wheatbuyers. The farmer had, therefore, when selling, to hawk a sample around to the various buyers to see who would give the highest price for it. In this enlightened day the buyers are on better terms with each other, and thoroughly understand the position and requirements of the farmers. It is not, therefore, necessary to take a sample around. We can take it straight to the nearest buyer, and rest assured that the price he offers is the highest we will get, for he knows exactly what the others will give, and should a man be rash enough to doubt his word, and take his wheat to the next town or station, he will find the price the same, or perhaps less, and that the buyer knows he offered it to the other fellow first. All this may be done by a simple little wire. Then about the bags. The old system was to have the weight of the bags deducted from the wheat, but now the buyer takes bags and all, and pays for gross weight, so that 5s. a bushel for wheat the farmer would get 3d. for the bag, and if it cost him 4½d. he would only lose 1½d. (at 2s. 6d. a bushel, 3d.), which is not much on one bag; but if, on the other hand, he got the bag for 2d., then he would net 1d. clear profit on the higher price, which is worth thinking about. But it is almost impossible to enumerate all the advantages possessed by the present day farmer, as compared with the by-goners. In addition to improved machinery, oil engines, windmills, buggies, and bikes, he has the assistance and advice of scientific men, agricultural bureaus, insurance societies, mortgage companies, State banks, courts of insolvency, hospitals, and destitute asylums! He is allowed to contribute in various ways to the general revenue, and is every year becoming a greater shareholder in the national debt! He has also a voice in State affairs, and may occasionally become a candidate for parliamentary honours.

Yes, the farmer is now a recognised institution in the land, and so deep an interest does the State take in his welfare that by special request he is asked each year to furnish, on a large blue paper prepared for that especial purpose, a full and minute account of all his doings, his income and expenditure, his profit or loss—no detail is too small to interest the Government, whose watchful eye is ever on him.

The comparison between past and present is great indeed. The old order of things has passed away, and farming to-day all the world over is being conducted on more systematic and scientific lines than has ever before obtained. These are real, live, go-ahead days, in which there is no time for vain regrets or looking backward. The man who now puts his hand—or himself—on the plough must not look back unless to see if there is a stump under the share! In these days of keen competition we must keep abreast of the times or go to the wall.

The method of cultivation in vogue in the colony in general, and these districts in particular, was none too good when the land was new and clean, but to continue it now simply means courting failure. Circumstances compel us to adopt safer and more economic lines, putting less land under crop, doing it better, and thereby getting larger returns. By a proper system of resting and working, the land can always be kept in good heart; and, seasons permitting, fair returns secured. Seed drills and artificial manures have come to stay, and will play a prominent part in future farming operations, and will, in fact, revolutionise farming; but the cost and construction of both must be greatly reduced to bring them profitably within the reach of all. But this is only a question of time, and at no very distant date we shall be using seed drills and fertilisers manufactured on the Peninsula. We know that increasing the production does not improve the price, but we have no choice in the matter. The price is regulated by the markets of the world, and we have therefore to

compete against the world, the flesh, and the devil. Our business is, then, to make the best possible use of our opportunities; increase and maintain the productiveness of our land; spend no time in vain regrets for what we did not get out of the past, but get all we can out of the present; endeavour in every legitimate way to better our position, and make farm life as pleasant and profitable as it ought to be; pay tribute where compelled to; be neighbourly and obliging towards each other; helpful to those in need; slow to anger, especially with wheatbuyers; respectful to all men, but taking sauce from none.

FEEDING SILAGE.

In feeding silage it should be borne in mind that it is a succulent forage, and naturally serves its best purposes when fed to animals most heavily during the earlier portion of the fattening period. It is cooling to the digestive tract, while yielding nutrition and furnishing bulk. Silage containing the full complement of grain will furnish most of the food materials required at first, but as fattening progress more grain should be given and the supply of silage somewhat reduced, for the digestive tract should not handle too much food of such large volume. The carcass of the animal under silage feeding will naturally be more or less watery, the same as it is when cattle are on grass. Feeders know that this is a condition particularly to be sought during the earlier stages of fattening where a high degree of finish is desired. Let more dry roughage be given and the supply of grain increased as the fattening period progresses, so as to build a firmer and drier flesh.

ENSILING POTATOES.

A number of French agriculturists have recently studied the desirability of ensiling potatoes. A considerable amount of heat is generated by the fermentation of the green material in silos, and it was thought this could be utilised, and the potatoes could be cooked as well as preserved.

In one test the potatoes were buried in a silo filled with crimson clover. They acquired the characteristic colour of that plant and the odour developed in fermentation. The tubes were flattened by the heavy pressure to which they had been subjected. When removed from the silo they were comparatively soft. They were examined microscopically and chemically, and it was found that they had been cooked by the heat of fermentation, and that they were rendered more digestible by the process; that is, the percentage of soluble material was increased.

Another silo was filled by surrounding about 1 ton of potatoes with corn (whole plant). Upon opening, the corn and potatoes were both found in good condition. The tubers were somewhat flattened, as in the previous experiment, but were more cohesive. The potatoes were not as thoroughly cooked, since the temperature and pressure were less than in the previous case.

As shown by analysis, the potatoes ensiled with crimson clover had lost less water than those ensiled with corn. The most striking difference, however, was the high percentage of cooked starch; or, in other words, the increased assimilability of the potatoes ensiled with clover. The crushed potatoes when removed from the silo lost weight very rapidly on exposure to the air, and formed a hard mass containing only 15 to 20 per cent. of water. In this condition they could be kept for a long time. When required for feeding purposes they were soaked in water, which they readily absorbed, and thus regained their softness and digestibility.

Another investigator ensiled chopped raw potatoes with 2 lb. of salt per 1,000 lb. of potatoes under pressure of 2,500 lb. per square yard. The total cost of washing, chopping, putting in the silo, and weighing 50 tons of potatoes

was about 15 dollars. The potatoes were put in the silo in the latter part of November. When the silo was filled the material was 5½ feet deep. Sixty-two days later the silo was opened, and the mass had sunk to a little over 3 feet. The temperature of the silo when filled was 39 degrees Fahr., and when opened it was 50 degrees. The ensiled potato pulp was white, but became blackened on exposure to the air. Cattle ate this pulp greedily, alone or mixed with cotton-seed cake.

Experiments made at the Minnesota Station have shown that, while the digestibility of cooked and raw potatoes by pigs was about the same, pigs could be induced to eat larger quantities of cooked potatoes. It was calculated that a ration of 15 lb. of potatoes and 4 lb. of shorts would furnish an amount of protein sufficient for maintenance, leaving a margin for growth.

On the basis of cost comparisons were made of the value of potatoes and other feeding stuffs. In the investigator's opinion, with foods at the present prices, it is doubtful whether it would be profitable to feed large amounts of potatoes to dairy stock, because cows require more protein than would be supplied by a fattening ration similar in character to that mentioned above.

Potatoes cannot be fed to young animals as safely as to more mature ones, since if fed in too large quantities they have a tendency to prematurely fatten the animal. With mature animals, when the object is principally the addition of fat to the body, potatoes may be fed to good advantage.

When the crop of potatoes is large and prices low, a method of storing and feeding potatoes to advantage is desirable.

A method of preserving potatoes which at the same time cooks them would seem worthy of trial, but it would doubtless be wise to experiment on a small scale at present.—*Bulletin No. 79 U.S. Department of Agriculture.*

The experiments above noted would appear to be a revival of an account of experiments made in 1896 by the French scientists, MM. Vauchez, Marchal, and de Monicault, not only with the potato, but also with the beetroot, with surprisingly satisfactory results.

From the *Journal of the Board of Agriculture* (London, 1897) we learn that, in these experiments, potatoes buried in a silo of Crimson Clover (*Trifolium incarnata*) acquired the characteristic colour of that plant, as well as the smell developed by fermentation. The tubers were much flattened by the heavy pressure to which they had been subjected; their cohesion also was greatly modified, and it was quite easy to pull them to pieces. The potatoes were examined microscopically and chemically by M. Girard, who ascertained that they had been cooked during the process. Thus MM. Vauchez and Marchal appear to have demonstrated the practicability of this method of cooking potatoes for fodder. The temperature in a silo of green fodder plants rises to nearly 160 degrees Fahr.; the potato is automatically cooked, and acquires the property of being easily digestible, which is requisite for its consumption by cattle.

That a high temperature (about 160 degrees Fahr.) is necessary, is shown by an experiment carried out by M. Mir, who, in order to determine whether maize, in spite of its size, could be preserved without being cut up, placed large quantities of the entire plant (stalks, leaves, and cobs) into a silo, and enclosed also about a ton of potatoes in the centre. On opening the silo, the maize and potatoes were both perfectly good. The tubers were flattened similarly to those in the experiment already mentioned, but they were more cohesive; moreover, the cooking appeared to be less advanced, and upon examination this proved to be the case. The reason of the difference was that the large entire stalks and cobs of the maize necessarily diminished the tight pressure, the temperature was not so high as in the compact mess of clover, and consequently the potatoes were not so well cooked.

Chemical analysis showed that the potatoes put into the clover silo had been less desiccated than in the maize; but the most striking differences were, on the one hand, the quantity of matter rendered soluble by the fermentation of the clover, and, on the other, the high percentage of starch cooked in the silo, consequently rendering the potatoes easily assimilable. It may be noticed also

that only mere traces of dextrine and soluble starch were found in the potatoes from the maize silo, while the normal insoluble starch amounted to nearly a third of the whole constituents. M. Girard concludes that the same results would have been obtained in the maize as in the clover under similar conditions of temperature, pressure, and moisture.

These experiments have also led to another important result. It appears that, when taken out of the silo, these crushed potatoes gives off their moisture very rapidly after exposure to the air, and are transformed into a hard substance containing only some 15 to 20 per cent. of water, in which condition they may be kept for a long period. When required for feeding purposes, it is sufficient to soak them in water for a while, which causes them to swell and absorb the moisture until they contain from 60 to 65 per cent. of water, and thus regain their softness and digestibility.

M. Tisserand communicated the results obtained by the ensilage of raw potatoes by M. Courmouls-Houlés. The latter took a mixture of several kinds of raw potatoes, chopped with the addition of 2 lb. agricultural salt per 1,000 lb. potatoes, and put them into a silo weighted with about 25 cwt. per square yard. The total cost of washing, chopping, putting into silo, and weighing 50 tons of potatoes was £3, or about ¾d. per cwt. The silo made on 20th November last was opened on 22nd January (sixty-two days later). The height of the silo at the time of erection was 5½ feet, and on 22nd January it had sunk a little over 3 feet. The temperature of the mass was 39 degrees Fahr. at the commencement of the experiment, 42 degrees on 1st December, and 50 degrees on 22nd January. On taking out the potato pulp, it was found to have retained its whiteness, but the parts exposed to the air afterwards blackened slightly. Cattle ate this potato pulp greedily, either alone or mixed with undecorticated Egyptian cotton-cake. The experiments are to be continued.

M. Vogué read a third note on experiments made by M. de Monicault, who placed beetroot and potatoes in a silo of fodder maize. On opening the silo, neither beetroot nor potatoes had changed their appearance, although the tubers could be easily divided, as if they had been boiled in water. Analysis showed 4·5 per cent. of sugar in the beetroot. Distillation gave no trace of alcohol. As beetroot contains on an average 12 per cent. of crystallisable sugar, it would appear that two-thirds of the sugar had been lost in the ensilage. No soluble starch, dextrine, glucose, or alcohol were found in the potatoes; and ensilage appeared to have caused the desiccation of the tuber without having cooked it.

THOSE MUSHROOMS AGAIN.

IN a former number of this *Journal* (September, 1899), we published a summary of an interesting article on mushrooms by the celebrated Polish mycologist, Jaczewsky. That summary, we are glad to say, has been noticed by Mr. A. C. True, the Director of the United States Office of Experiment Stations at Washington, who very kindly forwarded, on the 22nd November last, a paper summing up the work of the Sheffield Scientific School of Yale University on the food value of edible mushrooms. As that work is of considerable interest and scientific value, we reproduce most of it as printed in the Washington Official Farmers' Bulletin, No. 79:—

There is a widespread idea that mushrooms and other edible fungi are very nutritious foods. They are commonly said to contain very large quantities of protein (nitrogenous material), and to rank close to meat as sources of this important nutrient. The term "vegetable beafsteaks" has been applied to them, and other equally extravagant statements are frequently met with.

Numbers of analyses of edible fungi have been reported by the experiment stations. German investigators have also determined their composition and studied their digestibility by human subjects and by methods of artificial digestion.

An extended study of the food value of edible fungi, including their digestibility has recently been published from the physiological laboratory of the Sheffield Scientific School of Yale University.

Analysis does not show that edible fungi (mushrooms) possess a high food value, as will be seen by the following table, in which their composition is compared with that of several common articles of food:—

—	Water.	Total Nitrogen.	Albuminoid Nitrogen.	Non-albuminoid Nitrogen.	Protein.	Fat.	Carbo-hydrates.	Fibre.	Ash.
Common Mushroom (*Agaricus campestris*)	91·30	0·60	0·36	0·24	3·75	0·20	3·50	0·80	0·50
Shaggy Coprinus (*Coprinus cornatus*)	92·19	0·45	0·15	0·30	2·81	0 26	1·40	0·57	0·98
Inky Coprinus (*Coprinus atramentarius*)	92·31	0·36	...	...	2·25	0·24	...	0·72	1·29
Common Morel (*Morchella esculenta*)	89·54	0·49	0·37	0·12	3·06	0·50	1·60	0·91	1·08
Sulphury Polyporus (*Polyporus sulphureus*)	70·80	0·96	0·65	0·31	6·00	0·93	3·56	0·88	2·13
Oyster Mushroom (*Pleurotus astreatus*)	73·70	0·63	0·30	0·33	3·94	0·42	4·84	1·97	1·60
Potatoes	75·50	0·40	0·20	0·20	2·50	0·10	20·90	0·30	1·00
Cabbage	92·50	0·18	0·11	0·07	1·13	0·50	0·70	...	0·70
Carrots...	87·50	0·18	0·08	0·10	1·13	0·10	60·00	1·50	0·80
Wheatbread	35·40	1·52	1·47	0·06	9·50	1·20	52·80	...	1·10
Beefsteak (round)	63·00	3·00	...	...	18·75	8·80	...	...	1·00

From the above it will be seen that the mushrooms contain a very high percentage of water. In ordinary food materials protein is the most important nutrient. As regards protein content, the mushrooms rank about the same as potatoes, though they are decidedly inferior in food value, since they contain much less carbo-hydrates. Non-albuminoid nitrogen is thought to have little food value. As will be seen, the mushrooms do not contain a high percentage of nitrogen, and a considerable portion of the nitrogen present is in the form of non-albuminoids.

The value of a food is not determined alone by its composition. The digestibility—that is, the material which the body can retain and utilise—is of even more importance. The experiments at the Sheffield Scientific School showed that from 26 to 59 per cent. of the total dry matter of the edible fungi tested was indigestible. The total amount of digestible protein is about the same as in the potato. These results were obtained by the methods of artificial digestion. They agree in all essential points with those obtained by the German investigators. From them the following conclusions were drawn:—

As mushrooms contain from 75 to 92 per cent. of water, and as the total amount of protein present is comparatively small, it may be inferred that they correspond with vegetables. Indeed, they are decidedly inferior to many vegetables. The expression "vegetable beefsteak" seems peculiarly inappropriate when applied in a strictly chemical sense. A person depending upon mushrooms to furnish the amount of protein necessary in a day's diet would be compelled to consume about 8 lb. of the morel, a fair average species.

The carbo-hydrate content of mushrooms is relatively high, but there is no lack of carbo-hydrate foods in the ordinary diet, and, consequently, no great need for this constituent of the mushrooms.

Although mushrooms and other edible fungi can by no means be considered as highly nutritious foods, they are undoubtedly useful condiments or food accessories. They add to the palatability of many food materials when cooked with them, and may be served in many appetising ways. Their use can undoubtedly be extended by skilful growing and careful marketing. The principal edible fungus raised by market-gardeners in America as well as in Europe is the common field Agaric (*Agaricus campestris*), and the term "mushroom" is generally understood to mean this variety.

We do not, of course, take upon ourselves to decide who is right: Mr. de Jaczewsky, who declares that "the mushrooms are by far the most nutritious of vegetable substances, not excluding bread"; or the American scientists, who find them "in fact inferior to many vegetables."

Writing on the subject, Mr. H. A. Tardent, says.—In Europe, especially in Russia and Poland, where an immense consumption of mushrooms takes place, they are there mostly used after having been dried. In that state they are extremely light, a very large bulk being necessary to make 1 lb. That undoubtedly shows their spongy nature and a high percentage of water when fresh.

As to their digestibility, whoever has tasted them knows that a small quantity only can be eaten at a time, especially when fried in butter. If authorities differ on the nutritive value of mushrooms, they all agree on their usefulness as condiments and accessories to other dishes.

THE PRINCIPLES OF SHEEP-BREEDING.

No. 7.

By J. S. HERMANN SCHMIDT.

THE FLEECE.

In opening a fleece we notice that a wool staple, from the skin to the top, shows a more or less distinctly pronounced character. This is, by some wool experts, called the texture of the staple. The term is derived from the look which differently woven materials represent to the eye.

It is also applied to the peculiar look of certain materials, indicating their construction, whether cellular or crystalline, &c. We thus speak of the texture of ivory, of wood, of horn, &c. We also say the texture of a substance is fibrous, such as that of asbestos; or crystalline, such as the broken surface of a piece of steel. A staple of wool also shows such a texture. One glance will tell us whether we have to deal with a staple of well-bred or of ill-bred wool.

If the wool fibres are true, the texture of the staple is clear; that means regularity in all the fibres is conspicuous, and a high degree of waving renders the texture very clear and marked; where the fibres are true, but only slightly waved, the texture is not so marked, but clear enough to distinguish the regularity of the wave without any trouble. Cases likewise occur where parts of the same staple are true and waved, whilst others are composed of untrue fibres with an irregular wave. In other cases the texture is perfectly obliterated, showing no marks whatever, but it appears more like a piece of cotton wadding. The tops of the staples are formed in accordance with the character of the texture. In highly waved wools the texture is marked, the staples are more or less shafty, and the staple tops distinct. The more indistinct the texture is, the broader and more united are the staple tops. These features will, if practicable, be represented by photographs.

The Fleece.—All the staples cohering together form the fleece. A good fleece must be composed of staples that are superior in shape and texture; that means of fine cylindrical staples that show a clear wave, &c. The staples must stand as close to each other as possible, and they must give way to no natural parting or openness. The staples of a good fleece ought to part easily right down to the skin like the leaves of a book if purposely separated. To doing this the fleece should offer no resistance, nor should it be necessary to pull the tops of the staples violently asunder. By putting both hands on the fleece, and moving them away from each other, the fleece should readily give way and exhibit

a clear space entirely free from such wool hairs as appear to belong to no staple in particular; the presence of such interloopers generally shows that the fleece is not reliable as to trueness. The texture of such staples used to be called false crêpe—in distinction to true crêpe. The latter means an apparently loosely built staple without any or with very little yolk. A fleece to be valuable should be even all over; firstly, in fineness. The fibres grown on any part of the skin should be as fine as those grown on the shoulder, and there should be no coarser hairs intermixed with them, such as the kemp on the wrinkles of the neck, on the breech, on the root of the tail, &c. Secondly, in waving. All the staples of the body should have the same degree of waving, particularly on those places that are naturally inclined to curliness—for instance, the wither, the belly, and the brisket. Thirdly, it should be of equal density throughout, especially on the back, the rump, the flanks, and the belly. Fourthly, it should cover every part of the body. This is a subject to which the breeders in Australia have not paid sufficient attention. But it ought not to be lost sight of that an animal which carries good, solid, and cylindrical staples on every part of the body must return a higher amount of wool than another which does not, provided that both are equal in length and density. I mentioned on a former occasion that the best wool is produced on those parts of the skin which cover thick layers of muscles, such as the neck, the shoulder, the ribs, and the upper thigh; those, on the contrary, that are situated on bones and sinews have far less natural tendency to produce wool; and I have frequently heard the remark that if Nature does not intend those parts to produce wool, all the endeavours of mankind to accomplish that aim must be regarded as unreasonable. It is much to be regretted that this important feature in wool-growing has hitherto been so much lost sight of in Australia, and we must give the credit of having shown how much may be accomplished in that way to the Negrettis and Vermonts. It is evident that the surface of the belly alone, if covered with a dense, well-organised fleece, might produce nearly 1 lb. of wool, not to mention the cheeks, the two forearms, and the lower thighs, &c. The French and German merinos, as well as the Vermonts, are remarkably well covered on those parts—a proof that we ourselves may do a great deal which Nature has not done for us. A few additional ounces of wool cut from each sheep amount to a considerable item when there are several thousands of sheep to be shorn.

The money returns of a fleece are made up out of several factors:—1. The market value of that special description of wool which the sheep carries. 2. The quantity which the animal produces. 3. By a combination of value with quantity. Two pounds of very fine wool frequently pay less than 3 lb. of a middling description. With reference to the desirable qualities of the wool, I believe I have already said all that might be of interest. When speaking of the wool fibre alone with reference to the weight of the fleece, we have to pay attention to the following points: The weight of the fleece is made up through the length of the staple combined with a dense growth and the specific weight of the wool fibre itself. Clearly waved wools are longer than slightly waved ones, provided the natural height of the staple be equal. With reference to the weight of fleeces, we must not allow ourselves to be deceived by the number of pounds alone which the scale should indicate. The quantity of the yolk has a great deal to say to it. If we consider that apparently well-scoured fleeces might differ very considerably with reference to the quantity of yolk which they still retain, we must naturally come to the conclusion that it is necessary to determine, not the apparent, but the real—the absolute quantity of pure wool fibre that the animal has produced. The question wherein the remunerative qualities of a fleece consists now assumes a different aspect: Our task now consists in calculating the quantity of pure wool fibre produced by the animal for each pound of living weight—*i.e.*, how much money, in the shape of wool sold, has been produced by the pound of fodder consumed. The two French sheepbreeders, Mathieu de Dombasle and Mons. de Barbançais were, I believe, the first who made that question a subject of special inquiry. Mons. de Barbançais believes to have proved that all the larger animals carry a comparatively smaller skin

than those of inferior size. He says: "According to mathematical principles the surface of the skin is not in proportion to the volume of the body, and there is far less of it in a large animal than in a small one." This principle may be true, and the application of it correct. Amongst animals of an equal degree of fineness and density the smaller races of merinos deserve, according to Barbançais, to be preferred to the larger ones. I do not venture to say whether Barbançais' theory is correct or not; so much, however, is certain —that calculations of that nature must be highly interesting and instructive. For instance, there are two animals, A and B, of same age and sex, living under the same circumstances, and being of the same living weight. The fleeces are shorn equally close and scoured equally well, and have the same market value. A cuts 5 lb., B 4 lb. The quantity of grease, extracted through ether or bisulphide of carbon from samples of equal weight, amounts in A to 50 per cent., in B to 20 per cent. Consequently A returns 2·5 lb. of pure wool fibre, while B returns 3·2 lb. How much has that been per lb. of living weight, and how much fodder has it required? Such investigations, however instructive they may be, require a good deal of care, which can be bestowed on a very few and choice individuals only.

The Getting-up.—The manipulations which are necessary to bring the wool to market in the most saleable state are generally called "the getting-up." It comprises washing, shearing, sorting, and packing. Whilst growing on the sheep's back the fleeces are liable to be soiled. Foreign particles, such as dust, burr, grass-seeds, may find their way into the wool. Not only have these admixtures to be separated before the manufacturer can make any use of the wool, but the natural yolk of the wool as well. Very little, if any, Australian wool is now being washed on the sheep's back. As a rule, manufacturers prefer to get the wool in the grease, so as to employ the methods of scouring most approved of by themselves for their own particular purposes. The yolk of the wool has become, moreover, a marketable substance. At the same time scouring is largely employed for the sake of saving freight. I have explained on a former occasion that any system of scouring, as done in the colonies, cannot be regarded as a substitute for the scouring done by the manufacturer. By far the greater portion of the wool scoured here has to be scoured again in the factories or the scouring works at home. In fact, greasy wool is much preferred to that scoured in the colonies, because, firstly, the yolk of the wool, whilst in its natural condition, undergoes a process of decomposition where the fleeces are packed very tight or dumped, which facilitates its solution and complete removal. Secondly, in scouring wool, several of the elements instrumental in promoting this decomposition are removed; thirdly, those parts of the yolk still left in the wool after scouring here are just those waxy portions most difficult to remove by themselves. Thus colonial scouring is of no service to the home scourer. Most wool-growers are familiar with the various methods employed in scouring, and it would lead us too far to enter into a description of them here. The main points to which a colonial scourer has to pay attention are not to use water of too high a temperature; secondly, not to employ strong caustics in a concentrated form; thirdly, not to handle the wool too much, otherwise it will become felted and form strings and ropes.

Wool-sorting.—It is impossible to lay down any rules for sorting the fleeces on every station, because the sheep on many stations differ from each other very considerably as to the quality of their wool. Some flocks are made up from sheep periodically purchased from different stations. In such cases it would be best to pack the fleeces taken from the several breeds separately, provided their types are sufficiently distinct to warrant such a separation.

The reader will understand this subject much better after he has made himself familiar with the most important features of the woollen manufacture, which I intend to consider next; and I shall take up again the subject of wool-sorting later on.

CURRENT MARKET RATES (WHOLESALE) OF AGRICULTURAL PRODUCE IN SOUTH AFRICA.

The following table of current market rates (wholesale) of agricultural produce to 2nd December is taken from the *Agricultural Journal* of the Cape of Good Hope and the official *Agricultural Journal* of Natal of 8th December, 1899:—

—	Wheat, per 100 lb.	Barley, per 100 lb.	Oats, per 100 lb.	Oaten Hay, per 100 lb.	Potatoes, per Bag.	Beef, per lb.	Mutton, per lb.	Fresh Butter, per lb.	Eggs, per dozen.	Cattle (Slaughter).	Sheep (Slaughter).
	s. d.	*s. d.*	*s. d.*	*s. d.*	*£ s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*£ s. d.*	*£ s. d.*
Beaufort West ...	12 6	...	11 6	...	0 17 0	0 8	0 7	...	1 6	£10 to £18	£1 to 1 2 6
Maritzburg	...	...	...	1/1 to 12/1	0 13 0	...	...	2 1	1/5 to 2/9	...	...
Capetown	11 0	10 0	12 0	9 3	0 9 0	0 7	0 8	1 8	1 6	15 0 0	1 3 0
Clanwilliam ...	11 0	...	10 0	...	1 0 0	0 8	0 8	1 6	1 0	...	1 1 0
Craddock	13 0	12 6	12 0	10 6	0 17 6	0 9	0 11	2 6	1 6	17 0 0	1 7 6
East London ...	13 6	9 0	17 0	13 6	1 12 6	1 0	1 0	2 9	1 10	£18 to £26	18/- to £1 15s.
Graaff Reinet ...	12 6	12 0	10 0	11 6	0 15 0	0 7	0 7	2 0	1 9	12 10 0	20/- to £1 5s.
Grahamstown ...	...	9 2	...	8 4	0 12 6	0 9½	1 0	3 0½	1 8	...	...
Malmesbury ...	10 6	10 0	10 0	8 6	0 13 0	0 8	0 8	1 6	1 3	15 0 0	1 4 0
Mossel Bay	11 0	11 0	12 6	10 0	0 18 6	0 9	0 9	2 0	1 6	...	£1 5s. to £2 6s.
Port Alfred	...	...	...	7 0	0 12 0	0 9	0 10	2 3	1 3	£15 to £21 10s.	£1 5s. to £1/12/6
Port Elizabeth ...	...	10 0	12 6	9 6	0 15 0	0 8	0 9	2 0	1 9	...	...
Queenstown ...	13 6	8 0	7 6	6 6	0 12 0	0 8	0 8	1 0	1 6	...	...
Tarkastad	13 9	8 6	...	7 6	0 12 0	0 7	0 6½	1 0	1 3	...	...
Worcester	12 0	9 6	9 6	8 6	0 16 0	0 7	0 7	1 6	1 3	...	...

Although, at first sight, the prices above quoted appear high, yet we doubt if there would be much—or, indeed, any—profit left to the shipper of hay or chaff to Capetown, when railage (say from Clifton as a centre) to Brisbane, sea freight, insurance, cartage, commission, and other incidentals are considered. On 1,000 tons (deadweight) we find that the charges would be as follow:—

	£	s.	d.
Railage to Brisbane	694	0	0
Receiving and delivering in Brisbane, at 1s. 6d per ton	75	0	0
Storage, one week at 6d. per ton	25	0	0
Dumping 1,000 tons	75	0	0
Cost to Brisbane and preparing for shipment	869	0	0
Sea freight, Brisbane to Capetown—1,000 tons deadweight are equal to about 3,100 tons ship's measurement—3,100 tons at 45s. per ton	6,975	0	0
Receiving and delivering and harbour dues at Capetown, say	75	0	0
Storage, say	25	0	0
Insurance, say	100	0	0
	£8,044	0	0

The above does not include the value of the hay in Queensland or commission.

It may be argued that if hay can be sent from England and from America to Capetown at a profit, the same advantage could be obtained by shippers in Queensland. But this does not follow, because, in the first place, railage rates in the former countries are much lower than they are in this colony. Sea freights are also much lower there, and finally there is a plethora of tramp steamers at most ports in Europe and in the United States whose owners are

only too anxious to cut freights in order to obtain cargo. Bottomry at present is practically unattainable in Australian ports. Indeed, at this moment, shipping agents can give no guarantee when a steamer will be free to take Queensland cargo, all the available tonnage being engaged for some time to come.

Under such circumstances it would be good policy if our farmers were to seriously turn their attention to supplying the wants of the far Western station-owners, who are anxious to purchase fodder at good prices, but are unable to do so.

ANNUAL REPORT OF THE LOGAN FARMING AND INDUSTRIAL ASSOCIATION FOR THE YEAR ENDING 31ST DECEMBER, 1899.

To the President and Members.

GENTLEMEN,—I have the honour to submit the fourth annual report of this association, and, in doing so, I must state that it is with great pleasure I have to record the rapid progress this society has made since its inauguration. The interest that members have taken in the discussions on subjects that have been placed before them from time to time, together with matters of a progressive nature that were of particular interest to the Logan district, shows, by the increase of membership and in the formation of two new branches in the Alberton and Pimpama Island districts since last annual meeting, that our farmers are alive to the importance of acting in unison, as it were, to obtain the betterment of their condition as agriculturists, and of uniting together to reach the best sources of information and instruction to enable them to successfully compete with other districts.

It may be of interest to some if a brief *résumé* of the history of this association's progress and work be given, as showing what can be attained by the farmers and others of a district working harmoniously together for mutual help. This association held its first meeting in September, 1896, its primary objects being the extension of the agricultural resources, dairying, and general producing interests of the Logan district, a committee of 12 being appointed, with Mr. James Stodart, M.L.A., as its first president, an honour which he still retains. I might state here that the annual subscription decided upon—namely, 2s. 6d. per member—is the lowest of that of any kindred association in the colony. It was also decided that the society should be non-political, and the holding of annual shows was to be left in abeyance, the committee devoting its attention mainly to the development of the district's resources.

The year 1897 closed with 42 members, the total receipts being £10 7s., total expenditure £5 17s. 1d., leaving a credit balance of £4 9s. 11d. The year 1898 ended with 49 members enrolled, and the opening of two branches—one at Mount Cotton, the centre of the fruit-growing part of the Logan, and another at Waterford, an agricultural and dairying district. The total receipts for this year amounted to £48 6s. 6d., the income being greatly assisted by the society obtaining the second prize of £35 given by the National Agricultural Society of Queensland in the district competition. The past year, 1899, closed with a membership of 158, including branches; the total income, including credit balances, reaching £73 2s. 7d. This also includes the third prize of £25 obtained from the National Agricultural Association district competition of last year.

Since the inauguration of the annual conferences by the Agricultural Department, in July, 1897, the Logan Farming and Industrial Association has always been represented thereat by two delegates, who have read papers which have been of interest to the conferences and have received great attention from the members.

One of the most important duties of last year was the collection and exhibition at the Queensland National Association's Annual Exhibition at Bowen Park (in competition with the Warwick and Lockyer districts) of the various products and manufactures of the Logan and Albert, which this association

represents. Our members expressed much surprise at the result of the competition, owing to the peculiar judging of the exhibits. This association conformed to the schedule requirements as set forth by the rules of the competition, and whilst exhibiting the most varied and the greatest number of exhibits, including barley, oats, wheat, rice, tea, and coffee, yet, as these were not shown in sufficient bulk, the association only came in for third honours. But it is most gratifying to this association, that whilst only obtaining third honours, still the Logan district secured, in the four primary sections, the greatest number of points, namely:—Education, 5 full points; sugar, 6 points out of 8; fruits, vegetables, and roots, 8 points out of 9; manufactures, 7 points out of 9.

In the event of another competition being held this year, it has been decided by this council to have a perfect understanding as to bulk and quantities of exhibits required.

A large measure of praise must be given to the members and friends for the display made, and for the gratuitous help given by the ladies and committee.

In reference to the Greater Britain Exhibition held at Earl's Court, London, this association discussed the question of a small district display being sent, but, owing to the short notice received and to the election of council officers, it was left to the individual manufacturers to take the matter up. I am pleased to inform you that honours were obtained for our locally manufactured arrowroot and also spirits.*

During the past year discussions have been held and action has been taken on the following matters:—*Ticks and Inoculation*: The Stock Branch of the Agricultural Department was applied to, and officers were sent to the Mount Cotton, Waterford, Beenleigh, Pimpama Island, and Alberton districts, and upwards of 700 head chiefly of dairy cattle were inoculated, with a reported loss from fever of three head only. An urgent request for the loan of a stud bull from the Agricultural Department, for the use of small dairy farmers in the district, was discussed, and the request forwarded to the Minister for Agriculture, who submitted to the council the rules and regulations of the New South Wales Department in the matter of loans, and invited the further consideration of the association as to charges for services, maintenance, &c., and stated that the matter was now under the favourable consideration of the Department. Owing to the outbreak of the potato disease in parts of the district, prompt action was taken by the branches of the association, and after inquiries had been made, at the council's request, the Department placed the services of Mr. H. Tryon, Government Entomologist, at the disposal of the district to inquire into the nature of the disease, and to suggest, if possible, a remedy. Mr. Tryon accordingly visited the various parts of the district, obtaining samples, and making every inquiry as to the mode of cultivation, &c. His report subsequently appeared in the *Agricultural Journal*. The council having decided to assist its members in procuring new seed direct from Tasmania, upwards of 481 bags were procured, and distributed amongst its members at first cost. The question of rice-growing had been taken up by the Pimpama Island branch of the association, but, owing to the difficulties of marketing the crop (mainly due to the variety grown, not being of the kind best suited for the market, and also to the absence of a local mill for dressing the paddy when grown), the Agricultural Department was communicated with, and, through the advice received, 7 cwt. 1 qr. of seed known as the "White Java" was procured, and distributed by the association at first cost; and this appears to be doing well, and to be suitable for the district. A member of the association has guaranteed to erect a mill (which is to be one of the latest "up-to-date" kind described in the Bulletin on rice issued by the Department of Agriculture), and the machinery is now under order to arrive in time for this season's crop. The cultivation of Broom Millet has several times been taken up, the rich lands of the Logan and Albert being most suitable for the successful cultivation of this useful plant. The member for the district,

* Sugar, arrowroot, and spirits obtained first-class diplomas, entitling the exhibitors to a gold medal, on payment of its cost.—Ed. *Q.A.J.*

Mr. James Stodart, having a keen interest in the matter, generously imported and distributed free of charge to all those willing to cultivate it, a parcel of seed of the latest and best variety. The question of farmers' retail markets for the direct sales of produce to consumers received a large amount of attention from the council, and a committee was appointed to bring, if possible, to a successful issue the opening of such a market for the Logan farmers. Again the services of Mr. James Stodart were availed of, and he procured copies of rules and regulations of the Eastern and Victoria markets of Melbourne, which were discussed; and a deputation representing the association, accompanied by the president, waited upon the late Mayor of South Brisbane (Alderman Luya), who expressed his warmest sympathy with the efforts of the association in this direction. These efforts resulted in the opening of a farmers' retail market in South Brisbane on the 16th September last by the Mayor, Alderman P. Nott. Those farmers who have attended the market have been quite satisfied with the prices obtained, which show better results than formerly from auction sales or by selling to storekeepers. It would be well for members to attend the market more regularly, as on some days the supply is far and away short of the demand. They should also adopt a better method of getting up the articles for sale, such as honey, jams, butter, fruits, &c., in order to make them more attractive to the purchaser. But the retail markets will not attain a very large amount of success till a better system of dealing with the outside dealers and hawkers is adopted, which would bring them under the control of the municipal or of some other authority that should be established for that purpose. A toll or license fee should also be levied equivalent to the market charges. I must also refer to the practical results obtained by members of the No. 1 Branch, Mount Cotton, from the visits of Mr. A. H. Benson, Fruit Expert of the Agricultural Department, who visited us and demonstrated the cyanide process of treating fruit pests, scale insects, &c., which had begun to appear in the district. A hearty vote of thanks was accorded to the officers of the Department for their courtesy in meeting the wishes and desires of the association, and for their prompt manner of giving such practical demonstrations.

In conclusion, I have to thank the members of the council and the association for their hearty support in carrying to such a successful issue the various objects taken up by this association. Thanks are also due to the branch officers and members, who have always most cordially assisted in promoting the progress of their respective districts, and I feel sure the desire and aim of all is to secure the best possible results from the agricultural resources of this the oldest and most fruitful district of the colony.

F. W. PEEK, General Secretary.

Dairying.

DENMARK'S BUTTER TRADE.

THE Foreign Office (Consular) report on the trade and agriculture of Denmark in 1898 states the exports of butter (almost entirely to Great Britain) at 159,837,000 lb., of the value of £7,166,000, an increase of 17,325,000 lb. in quantity, and of £700,000 in value, as compared with 1897, being shown. On the other hand, the imports of feeding stuffs for cattle have increased enormously. Last year 1,028,000,000 lb. (over 18,000,000 bushels) of maize were imported to help in the sustenance of the dairy cows. It is evident that there is plenty of room for Australian competition with Denmark. That competition during the ensuing season is certain to be greater than ever before. Still we should not belittle our competitors, and fail to remember that their increased production last year alone was in excess of our total production for home requirements and exports.

FOOD PRESERVATIVES.

The Departmental Committee on Preservatives and Colouring Matters in Food met in November last, at St. Stephen's House, Westminster, Sir Herbert Maxwell, M.P., in the chair. Mr. J. Kellitt, of Liverpool, speaking on behalf of the Grocers' Federation, said that it was now absolutely necessary to use borax or boracic acid for ham, bacon, and butter, on account of the great demand for a mild-cured article. Borax, in his experience, was the most effective preservative he had known, especially for stopping fly-blow. Quite 75 per cent. of the hams and bacon sold in this country were treated with the preservative. After the bacon or ham had been prepared for cooking by the consumer most, if not all, of the borax had disappeared, so that in actual consumption the percentage of boracic acid present at the time the article was consumed must be small. Captain T. W. Sandes, who had started a creamery in county Kerry for the benefit of his tenants, said that he used generally to send to England butter that they called saltless—that is, butter that was cured with 1 lb. of preservative to 1 cwt. of butter. The preservative he used was boracic acid. The saltless, but preserved butter was bound to be good butter because impurities could be so easily detected in it, whereas the heavy salted butter need not be, as the salt more or less covered a few of the "sins" in the butter. Mr. J. Wheeler Bennett, who appeared on behalf of the London Chamber of Commerce, said that the trade in Canadian hams had increased since 1889 from something like 300,000 dollars to 1,800,000 dollars in 1898, and this he attributed to the use of preservatives. If the treatment of hams by borax were prohibited, the whole of this gigantic trade from Canada would come to an end. There was a very large and increasing trade in Australian butter, and that trade hinged upon the use of borax, the butter being washed in a solution of the preservative. The committee then adjourned.—*Times.*

PIGS AND THEIR MANAGEMENT.—No. 3.

MILKING QUALITIES OF A BROOD SOW.

The value of a brood sow depends, to as great an extent, or even greater, than any other one thing upon her milking qualities. The sow that is a poor suckler is never profitable as a breeding sow. She has usually small litters, and these fail to thrive for the simple reason that they are not fed. On the other hand, the sow that is a good milker—or, as we say, a good suckler—has usually large litters, takes care of them so well that they make rapid advancement and soon outstrip the rest of the herd. They grow from start to finish, and prices must be low and feed high if they do not pay a profit. A good brood sow that is a good suckler is worth two that are poor sucklers, and even more. Whether the pig department of the farm in any year gives a profit or a loss depends largely upon the milking qualities of the brood sows.

MILKING QUALITIES OVERLOOKED.

Singular as it may seem, this point has been largely overlooked by farmers and even by breeders of improved pigs. The present ideals of beauty in any kind of live stock are against the development of milking qualities, and the effects are seen not merely in pigs, but in cattle as well. In fact, on many breeders' farms the working herd of any kind of stock is of different type from the show herd. The one is selected with an idea of beauty of form and colour, something to catch the eye of the buyer; the other with the idea of utility and money-making. The farmer who buys brood sows at an agricultural show is not very likely to secure good milkers. Where fat covers a multitude of sins, as it always does, one of the most prominent of these sins, as well as one of the most frequent, will be barrenness, or at least shy breeding and poor milking.

HOW TO SELECT GOOD MILKING SOWS.

The best way to secure a milking herd of brood sows is to select pigs sows that are good milkers. Select, at least, from the best milkers in the he and condemn to the fattening pen the rest, no matter how handsome they m be or how nearly they may come up to the fashionable ideal. By continui this process from year to year, a very fair herd of sows will be secured.

BREEDING FROM IMMATURE SOWS.

To breed steadily from immature sows means loss of size in the proge weaker constitutions, a greater tendency to disease, and consequently a l profitable animal from every point of view. Successful pig-breeders know t well, and retain good brood sows so long as they are profitable. The matur mother raises her progeny better because her system is better able to withsta the severe strain upon it.

Most farmers, however, avoid a part of the evils of too early breeding b replacing their male animals with others from established herds and flock which keeps up the vigour of the young stock to a great extent. But they lo in the smaller litters, and the frequent losses of the young, because their da are not able to raise them properly. This use of immature stock as breedi animals has done great harm to cattle, sheep, and pigs in Australia.

OVER-FAT BROOD SOWS.

If, says the *Swinebreeders' Journal*, you imagine your sow is getting t fat to farrow her litter of pigs, for mercy's sake do not be so ignorant as t shut off her feed. A more detrimental change for both sow and pigs y could not make. It is better to increase her feed. Shortening her ratio weakens all forces of the body and prepares an open door for disease. A then you cannot imagine what is killing your pigs, and the truth of the busine is, they were living abortions to start with, being farrowed with such litt vitality that as soon as their "wise master" saw proper to wean them and p them to chewing for existence they began to die, apparently without a caus they being too weak to assimilate the food given them, the digestive apparat being ruined before being brought into the world, and they die of she weakness. The sow should gain a fraction in weight every day she is carryi her pigs, and should always be given a variety of feeds. It is absurd to thi you can make her too fat if fed this way. Exercise is absolutely essential.

PREPARE FOR FARROWING.

A great many that keep hogs suffer great loss from neglect in noting th date of service and being ready at farrowing time to give the sow suitable atte tion. The careful and most successful breeder knows from his breeding-boo the very day the sow ought to farrow.

If you are one of the careless kind try squeezing her teats. If you succee in getting a fair lot of milk, she will farrow in less than 24 hours. And, agai this successful breeder knows the tendency to constipation under confinemen and that is the beginning of a long train of ills.

He sees that her feed and drink are adjusted to her present condition knowing that she is to eat for herself and the coming litter, and the feed mu be varied and nutritious. The aim is not to fatten, but to strengthen the so and to grow bone, muscle, and vigour in the pigs.

Nature is wise enough not to spend time in developing milking capacit beyond the wants of the litter. It will thus be seen that the sow that is a goo milker must be built up from the foundation. Select, first, an inheritance i that direction, with vigorous and abundant health, and then feed along the lin of Nature as indicated.

By thus selecting with an eye to inheritance of milking qualities, by feedin from birth, or rather from conception, with the object of securing vigorous an abounding health, and along the lines Nature has indicated, the dairy farmer wi be working with Nature to victory, instead of against her to inevitable defeat.

WHY SOWS EAT THEIR PIGS.

Mr. J. S. Woodward, writing in *National Farmer*, U.S.A., says:—

Why does a sow sometimes destroy and eat her pigs? There are a good many reasons given for this habit. Among them the following:—Hysteria, something similar to puerperal mania in the human family; an unnatural craving produced by an unhealthy condition of the body; an acute thirst due to too much grain being fed and an insufficient supply of water.

I might give a half-dozen other reasons, but if investigated to the bottom they will all be found to be due to one cause—improper feeding of the mother during pregnancy. No sow when farrowing in summer, running in good pasture with plenty of water to drink, ever eats her pigs.

It makes me tired to read, as I did a few days ago in a paper devoted to the swine industry, such advice as to be sure to "feed a pregnant sow for a few days before farrowing a piece of fat pork daily, and if costive to give a dose of salts sufficient to move the bowels and cool the blood." What nonsense! Why not be sensible and tell the owner to feed the sow, not only for a few days or weeks before farrowing, but during the whole period on a succulent, cooling diet I will stake my reputation as a farmer that no sow kept in a roomy warm pen, and fed liberally on roots, wheat middlings, with a little linseed oil meal added and plenty of skim milk, will ever eat her pigs.

Of course, it is better not to meddle with the sow at farrowing time unless assistance is absolutely necessary; but every sow, from her youth up, should be handled and made so tame that the presence of her owner will not annoy her, so that he may be around, but if she be fed properly, as above indicated, she will need nothing until she is through, when in a short time she should be given a drink of quite warm water, and then left until she comes from her bed of her own accord, which will sometimes not be for a full day or more. Where young sows eat their pigs it is evidence that they are not in right condition. Very likely they are costive and feverish. If they had been fed a pint of linseed oil about twice a week for two weeks before farrowing, it would have prevented them from desiring to destroy their young. An old sow that has once formed the habit of eating her pigs is persistent in it, and it is difficult to turn her from her ways. She should be prepared for the bacon-curer sooner than to run the risk of her continuing in her wickedness.

HEALTHY PIGS.

Every farmer interested in preserving the health of his pigs—and every one should be—finds cleanliness one of the standard essentials. Filthiness and unsanitary methods were the foundation cause of the plague among human beings in olden times. In this age, every city is alive to the best sanitary regulations for the protection of the health of its citizens. It is considered of vital importance to look after the cleanliness of a city as a means of saving the lives of the inhabitants from epidemic, pestilence, and plagues. Every farmer should look after the quarters, pens, and houses occupied by his herd of swine, every spring at least. All manure and excrement should be thoroughly cleaned out and hauled into the field, where it will more than pay the expense of the labour in taking it there, besides contributing to the healthiness of the swine.

TREATMENT OF SICK PIGS.

Pigs are about the hardiest of all farm animals. Considering the rough quarters some of them have to live in, it is surprising that the death rate is not higher. Nevertheless, pigs do die now and again. A little watchfulness and thoughtfulness right at the start may save trouble and loss later on. If you find a pig with hard, dry, feverish skin standing round as if he did not want to be disturbed, speedy action is needed. Generally the pig will be constipated. If so, a dose of Epsom salts should be given in sweet milk. Separate it from the others and put it in a dry, comfortable pen. If the pig should be chilly, give it good hot slop or milk, with some cayenne pepper in it, and get up a

warmth and perspiration. Take care that no draught is allowed to blow on it. Do just about as you would if a man were sick. Constipation is the beginning of many ailments; prevent it and you preserve health.

COMMON AILMENTS OF PIGS.

THUMPS.

If the sow gets too fat when the pigs are quite young, and they have not become used to exercising, then thumps will be most sure to follow. It can be avoided by driving the pigs about the pen after the dam has left the pen; and if the weather gets so warm so the pigs can go outside the pen, then make them follow the dam. The cause of the thumps is the fat that gathers around the blood-making machinery of the pig and makes the blood flow slowly; and, of course, the pig gets sluggish, and if not attended to soon dies.

Thumps, as a rule, is caused by too high living and too little exercise. Lessen the feed and give regular exercise every day.

SORE TAILS.

While the pigs are lying around their pens in cold, damp weather, their tails are apt to become sore. The cause of this is damp, cold nests. Let as much sunshine in on the pigs as you can. If the tails feel hard and rough, bathe them with lard and carbolic acid—about 1 drop of acid to 1 oz of lard. This should be repeated every day until the scab begins to peel off. This is also a good remedy for scurvy.

CONSTIPATION.

This may follow too severe measures to prevent scours, and when too much dry feed is sometimes used. In this case feed linseed meal and soft feeds to the dam. For costiveness in pigs, give freely of bran mashes mixed with linseed tea. Make no more of the mashes than the pigs will eat up clean, as if any is left over it may sour.

SORE MOUTHS.

This is another blood disease, and can usually be cured if taken in time. The best remedy that I know of is ½ lb. each of Epsom salts, soda, and sulphur mixed, and given to the dam in tablespoonful doses in slop three times a day until the result is attained. Some people have an idea that it is the little black tusks that cause the sores, but it is not.

SWINE FEVER.

This disease is termed in America "hog cholera." It is a highly contagious disease peculiar to swine, associated with inflammation of the lungs and alimentary tract, causing death in from ten to thirty days. Professor McFadyean, of the London Veterinary College, claims to have discovered the true disease-producing organism of swine fever; but, as not less than three, and possibly four, species of bacilli have been cultivated from swine fever at different times by Klein, one by Reitsh Jobert, and one by McFadyean, and as cultures of all these bacilli have been credited with producing swine fever in experimental animals, and as each one has been pronounced *to be the contagium* of the disease, these statements must be accepted with caution, and until a bacillus has been cultivated from swine fever, from which another investigator can prepare sub-cultures, and with these sub-cultures produce the typical ulcerations of swine fever in pigs on a farm, or on premises in which swine fever is unknown, it is well to conclude that the contagium has not yet been discovered. The lesions of swine fever may assume the form of a diphtheritic or croupous inflammation, the deposit of which may fill the intestinal tube, accompanied by inflammation of the lungs, skin, and fever.

In the early stage sometimes symptoms are not perceptible, and although the animals are quite capable of transmitting the disease nothing may be noticed except cough and swelling of the glands of the groin; thus it is not difficult to understand how affected animals may be removed from one part of the country unsuspected, and be thus the means of spreading the disease. In

typical cases, however, the animals exhibit dulness, are off their feed, have thirst and other febrile symptoms, occasional rigours followed by red spots upon the head, neck, and ears. The animal affected is prostrated, has no appetite, but seeks cold water; the movements become difficult and unsteady; it tries to bury itself under the straw, lies on its belly, the temperature of the body varies, but the ears are hot and painful. Later on, well-marked rigours appear, the tail is pendant or limp, the eye of a brick-red colour, the respirations are hurried, and the pulse quick, the fæces (dung) hard and black. Nausea and vomiting may appear, and weakness of the fore limbs may take place. A dry snout covered with red spots, which also appear on other parts of the body, follow. Diarrhœa sets in, and the evacuations may become blood-stained.

The incubatory or hatching stage is from eight to ten days; the mortality 40 to 50 per cent. higher among young pigs. Death occurs in eight to sixteen days, and it attacks swine of all ages. Old pigs may linger on for weeks and ultimately recover, in the meantime acting as centres of infection. The large intestines are principally affected; in chronic cases inflammation of the lungs is more or less pronounced. After death, the appearances most commonly are, inflammation of the membrane surrounding the intestines and separating them from the walls of the abdomen, redness and enlargement of the mesenteric glands in the abdomen and the lymphatic glands in the lungs. There is generally ulceration, especially of the first part of the large intestine (colon) and the valve (*ileo-cæcal*) which divides the large from the small intestines, or a diphtheritic exudation, sometimes pale-yellow, more commonly greyish or black. The spleen is enlarged and the liver congested, and hæmorrhages in the kidneys. Cases in which the lungs and intestines are simultaneously affected are not numerous, and sometimes the lungs may be found to be quite healthy in conjunction with long-standing disease of the intestine.

Attempts have been made to ward off the more violent form of the disease by inoculating animals with a milder form, but, as the Swine Fever Order (1896) renders notification compulsory, the stamping out system has to be applied, which, up to the present, has not been satisfactory, as the disease is still present.

SWINE FEVER IN QUEENSLAND.

Some cases of sickness amongst pigs at Mackay were recently reported to the Minister for Agriculture, who at once despatched Mr. McLeod, a young veterinary surgeon, to that place to make inquiries. After some investigation, Mr. McLeod found a case, and he pronounced it swine fever. Portions of the body were sent to Mr. C. J. Pound for examination, and Mr. Pound confirmed the diagnosis, finding the bacteria of the fever. About eighty pigs in one locality at Mackay were destroyed to prevent the spread of the disease. Mr. Pound, in a report to the Minister for Agriculture, has mentioned that the fever is not uncommon about Brisbane, and has local names of "heaves," "staggers," "pants," and "contagious pneumonia." Mr. Pound says that the disease is prevalent specially amongst animals fed on offal at slaughter-yards, and in some cases the losses have been 40 per cent. to 70 per cent. The owners of pigs which develop the disease kill off all the animals which show symptoms of quickened respiration. It is imperative, if the disease is to be stamped out in Queensland, that every case of sickness should be reported to the Department of Agriculture, and care will be taken then to prevent its spread.

WORMS IN PIGS.

Pigs are infested with several kinds of worms, some in the adult stage, others in an immature state, the adult forms of which are found in other animals, but which cannot develop without passing one stage of their life-cycle in the body of a pig, or an animal of similar character and habits.

The adult worms most commonly met with in pigs are—First, the *Ascaris suilla*, which is a large, round white worm, pointed at both ends, and which is often seen in the fæces (dung) of pigs. It inhabits the bowels, and varies in length from one inch to several inches.

Treatment.—Give santonine and sulphate of iron in food, followed by a drench composed of turpentine, oil of male fern, and linseed oil.

Worms.—A few doses of santonine and sulphate of iron (powdered) given once each day when the pigs' stomachs are empty, and followed by two or three doses of Epsom salts at intervals of about a week, will rid pigs of worms. A few cinders for them to eat, or some charcoal given in the food, will also assist in clearing the systems of the pigs and rendering the bowels unsuitable for the development of more worms. The dose of santonine for a pig six months old is 8 grains, and of sulphate of iron about 12 grains.

Arsenic is a dangerous drug, and must be given with great caution. Some people say you cannot poison a hog with arsenic, but this is a mistake; it has been done. We would advise that you do not tamper with the drug for this purpose. Veterinary surgeons use arsenic in the case of scabby skin diseases, such as eczema, psoriasis, mange, &c.

An occasional dose of Epsom salts is very useful in expelling these worms and preventing others developing.

Secondly, the *Strongylus paradoxus*, known as the "husk" worm, which is found in the windpipe and bronchial tubes, where it sets up irritation, causing the husky cough well known to many pig-keepers.

Treatment.—A drench composed of turpentine, spirits of camphor, tincture of assafœtida, and linseed oil should be given twice a week for one, two, or three weeks, according to the severity and continuance of the symptoms.

Stephanurus dentatus and *Trichocephalus crenatus* are the names given to two other round worms which are rather common in the bowels of pigs

The same treatment is employed to expel them as in the case of *Ascaris suilla.*

Other round worms are also found in pigs occasionally, but, except the *Trichina spiralis*, they are unimportant so far as pigs in this country are concerned.

Trichina spiralis is a minute round worm found in small cysts or bladders in the muscles or flesh of pigs.

These worms are transmitted to man, in whom they produce the disease known as *Trichinosis*, by the consumption of raw or *undercooked* pork, and they are again conveyed to pigs by these animals eating the excreta and filth from affected human beings. Although common in Germany and other continental countries, this disease is not often met with in England, and when an outbreak does occur it is almost invariably from the consumption of foreign hams, &c. Thorough cooking destroys these worms, and it is because hams, &c., are so frequently eaten semi-raw on the Continent that this disease is prevalent there.

Adult Tapeworms are very seldom met with in pigs, but they (pigs) often form the intermediary bearer or host of the encysted form of tapeworms which attain maturity in other animals when partaken of by them in the meat, the chief of these being the encysted tapeworm which produces the condition known as "measly pork" in the muscles of pigs so affected. Each of these "measles" is capable of developing into the tapeworm known as *Tænia solium*, and which infests man; hence its importance when occurring in pigs in the encysted or "measle" form, for this worm cannot develop, except by passing this particular stage of its life in the muscles of pigs, and, as it is readily destroyed by sufficient heat, the importance of avoiding underdone pork is apparent.

Two other cystic or bladder worms are sometimes found in pigs, the *Cysticercus tenuicollis* and the *Echinococcus veterinorum*, the latter being the encysted stage of the smallest kind of tapeworm which infests dogs, and which is known as the *Tænia echinococcus.* The cysts or bladders themselves, however, often attain an immense size.

The liver fluke (*Fasciola hipsatica*) is occasionally met with in the livers of pigs, but it is not often that they are present in sufficient numbers to materially interfere with the animal's health.

It is important that worm medicine should be given on an empty stomach—that is, after the animal has fasted for several hours—and no food, except a *small quantity*, in which some medicines may be given, should be allowed for two hours after.

Two teaspoonfuls of saleratus dissolved in water and poured into the slop will remove worms from pigs. When you notice a pig not doing well, when it refuses its feed and begins to look scrawny and sick, the chances are 99 to 100 that it has worms. If you kill one and examine it you will find a bunch of worms in its intestines perhaps as large as your fist. These cause constipation and fever, which kill pigs. Oftentimes the worms will eat through the intestines into the stomach. Dissolved saleratus in the proportion of two teaspoonfuls to every gallon of water will kill the worms, and almost immediately your pigs will begin to thrive and look well again.

SCOURS OR DIARRHŒA IN YOUNG PIGS.

This is the most common trouble with young pigs, and it is the result of several causes: Over or improper feeding of the sow; cold, damp beds or bedding; running in the grass when the dew is on; sudden changes in the weather; sudden changes from a warm, dry pen to a cold or wet one; impure, unsound, or musty food; insufficient food or water, &c. When the pigs are young in most cases the remedy must be administered through the food given the sow, but in order to do this intelligently you must, to the best of you ability, remove the cause as well as apply remedies. If it is caused by over or improper feeding, musty food, stale or sour slops, correct by giving sound feed and sweet scalded milk. Frequently it may be checked by feeding only dry maizemeal or whole wheat for a few days. If scours result from taking cold, give sulphur in feed to sow for several days. If from over or impure feed, give charcoal liberally, and sulphur and a little carbolic acid in the food. If pigs are old enough to eat, scalded milk, thickened with flour, dry maizemeal, or whole wheat are excellent.

SCOURING PIGS.

HOW TO AVOID AND CURE SCOUR.

One of the most common and costly troubles of the pig breeder and feeder is diarrhœa, or "scour," as he generally calls it, says a writer in "Bibby's Quarterly."

This is caused by too much feverish and rich milk. Sometimes little pigs are born with the scours. Sows that produce such pigs usually are very nervous at farrowing times, and seldom save all their pigs. Feed the sow regularly, and a day or two before she is due to farrow do not feed as heavy as before. Give her warm water the first twelve hours after farrowing, and the next twelve hours a thin bran mash. Exercise the sow and litter after the third day. Feed litter some dry oats if you have them. To stop the pigs from scouring, I have been very successful in using a teaspoonful of copperas to a sow with seven or eight pigs. There are some things which should never be fed to a suckling sow: sour things, such as sour butter-milk, sour whey, &c.

Diarrhœa is really not a disease in itself, but only a symptom of a diseased condition, being a morbidly frequent evacuation of the intestines; but it is so specific in its character that the name will always be retained to express this state without reference to its cause.

In sucking pigs it is very generally associated with an altered or depraved condition of the milk of the sow, due to over or improper feeding. In these cases it is a very safe proceeding to change her diet and give her a full dose of castor oil, which will act on young pigs through the milk, and help to get rid of anything causing irritation of the intestinal canal.

If the pigs are a month old they may themselves get a teaspoonful of castor oil, with 10 to 15 drops of laudanum, as a preliminary to further treatment, which may, or may not, be necessary. Castor oil not only gets rids of irritating material that may be the cause of scour, but after this action it tends to bind the bowels. After the preliminary purgative dose of oil it may be useful to treat diarrhœa in sucking pigs by giving the sow a few old beans.

Exposure to wet and cold is also a cause of porcine diarrhœa, and young pigs reared in damp buildings or on cold stone floors very commonly scour.

THE REMEDY.

The remedy then is, of course, dependent on the removal of the cause.

Very often, diarrhœa is the result of improper feeding or the use of cheap meals. Pigkeepers are often tempted by stuff offered at a low price, such as mill sweepings and the dirt and refuse of cleaning machines.

Some months ago such stuff was extensively advertised in the agricultural journals, and led to a prosecution, which, it is to be regretted, failed, so careful is the law of the adulterator, and so fixed is the idea that "adulteration is a form of competition."

The only way to avoid trouble with "scour" is to pay a fair price for middlings and other meals, and to deal with firms which have a reputation to lose or maintain, or to buy corn and get it ground, than purchase offals from unquestionable sources.

Diarrhœa from cold may be treated by giving a mixture of juniper berries, tormentilla root, and camphor, in doses to suit age or weight.

When medicine is necessary after the preliminary dose of castor oil, the old-fashioned mixture known as "Sheep and Calves' Cordial" is very useful. An example of a formula is: Prepared chalk, 1 oz.; tincture of catechu and tincture of opium, of each ½ oz.; Armenian bole and essence of peppermint, of each 2 drachms; water to 6 oz. Dose, ½ oz. to 1 oz. twice a day, or a teaspoonful to sucking pigs.

Palsy, paralysis, or what is known as weakness in the back of a pig, and loss of power of the hindquarters may result from an injury to the spine, such as heavy stroke across the back, or cold causing congestion, or damaged food. If caused by an injury, it is hardly curable; if by cold, or bad food, give a mild physic of salts or sulphur and charcoal, and apply a stimulating liniment along the spine. A change of location to cleaner quarters, more room, and purer air is often beneficial.

There are several remedies in case of scouring in young pigs. First, reduce the feed of the dam or change it to something else. If this does not stop it, take a lump of alum the size of a walnut, dissolve it in 1 pint of water, give each pig 1 teaspoonful three times a day. Another good remedy is to parch wheat flour until brown, and mix with skim milk and feed in the same way, or, if the pigs are old enough to eat, feed in a trough. This last is an excellent remedy for scours in calves or young colts.

OVERFEEDING BAD.

Stuffing newly weaned pigs in order to force them on rapidly, or feeding them with foods to which their undeveloped digestive organs are not accustomed, often causes diarrhœa, and thus defeats the end in view. Go slowly for a start and feed, not so much according to what is available as to what, in view of their age and previous management, the pigs can digest and assimilate. There is a limit to the ability of pigs to consume rubbish.

It must be noted, too, that diarrhœa is often a feature of tuberculosis, to which, next to cattle, the pig is prone, possibly from the consumption of the product of tuberculous cows. In such cases there would be chronic diarrhœa and more rapid wasting than usually characterises this condition of the animal.

THE DAIRY HERD.

QUEENSLAND AGRICULTURAL COLLEGE.

Returns from 1st to 31st December, 1899.

Name of Cow.	Breed.	Date of Calving.	Yield.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.			
Annie Laurie	Ayrshire	12 June, 1899	633	3·5	24·8	
Blink ...	,, ...	23 April ,,	55	3·8	2·34	Dry, 8-12-99
Isabelle ...	,, ...	2 June ,,	414	3·6	16·68	
Lena ...	,, ...	17 June ,,	589	3·5	23·08	
Linnet ...	,, ...	19 June ,,	687	3·6	27·69	
Rosebud ...	,, ...	13 April ,,	391	3·7	16·19	
Ream ...	,, ...	13 Aug. ,,	116	3·9	5·06	Dry, 14-12-99
Leesome ...	,, ...	12 Oct. ,,	785	3·4	29·89	
Ream Routhie	,, ...	19 Sept. ,,	585	3·6	23·58	
Laverock ...	,, ...	7 Dec. ,,	663	3·4	25·24	
Effie ...	Jersey	16 Dec. ,,	310	3·9	13·54	
Content ...	,, ...	11 July ,,	615	4·0	27·55	
Eileen ...	,, ...	13 Aug. ,,	612	4·5	30·8	
Jersey Belle	,, ...	4 July ,,	579	3·9	25·28	
Stumpy ...	,, ...	1 July ,,	685	4·5	34·51	
Playful ...	,, ...	6 Aug. ,,	444	4·3	21·48	
Ivy ...	,, ...	2 Oct. ,,	421	3·9	18·37	With first calf
Opale ...	,, ...	16 Dec. ,,	275	3·9	12·0	
Beatrice ...	,, ...	19 Oct. ,,	516	4·0	23·11	With first calf
Bashful ...	,, ...	16 Nov. ,,	593	3·6	23·9	,,
Connie ...	,, ...	29 Sept. ,,	397	4·1	18·22	
Fancy ...	South Coast ...	7 May ,,	88	3·8	3·74	
Scarlet ...	,, ...	13 Oct. ,,	689	3·5	27·0	
Misery ...	,, ...	4 May ,,	456	3·3	16·84	
Toughy ...	,, ...	11 Sept. ,,	712	3·2	25·51	
Plum ...	,, ...	3 Dec. ,,	515	3·3	19·06	
Banjo ...	Devon	5 Oct. ,,	472	3·5	18·5	
Broad ...	,, ...	5 Oct. ,,	561	3·9	24·39	
Rosie ...	,, ...	11 Oct. ,,	599	4·1	27·3	
Monday ...	,, ...	24 Oct. ,,	591	3·7	24·48	
Patience ...	,, ...	5 Oct. ,,	511	3·5	20·02	
Gertie ...	Shorthorn ...	3 June ,,	493	3·8	20·97	With first calf
Spot ...	,, ...	17 Oct. ,,	522	3·6	21·04	,,
Nestor ...	,, ...	27 Feb. ,,	27	4·0	1·2	Dry, 6-12-99
Plover ...	,, ...	25 April ,,	453	3·8	19·27	With first calf
Queenie ...	,, ...	20 April ,,	327	3·8	13·91	,,
Painter ...	,, ...	4 Sept. ,,	687	3·7	28·45	,,
Brush ...	,, ...	12 Sept. ,,	592	3·8	25·18	,,
Blossom ...	,, ...	14 Sept. ,,	657	3·6	26·48	,,
Florrie ...	,, ...	15 Sept. ,,	612	3·6	24·67	,,
Kit ...	,, ...	16 Sept. ,,	672	3·5	26·34	,,
Frizzy ...	,, ...	27 Sept. ,,	644	3·7	26·67	,,
Kate ...	,, ...	30 Aug. ,,	424	3·6	17·09	,,
Violet ...	,, ...	1 Oct. ,,	573	3·6	23·09	,,
Laurel ...	,, ...	4 Oct. ,,	792	3·8	33·7	
Restless ...	,, ...	4 Oct. ,,	743	3·3	27·45	
Rosella ...	,, ...	9 Oct. ,,	764	3·6	30·8	
Redmond ...	,, ...	6 Oct. ,,	754	3·8	30·88	
Jane ...	,, ...	10 Oct. ,,	613	3·6	24·7	
Shelly ...	,, ...	13 Oct. ,,	549	3·6	22·13	
Peggy ...	,, ...	14 Oct. ,,	443	3·6	17·85	
Stranger ...	,, ...	15 Aug. ,,	590	3·9	25·7	
Empress ...	,, ...	23 Aug. ,,	588	3·9	25·68	
Mundah ...	,, ...	29 Sept. ,,	643	3·5	25·2	
Pokey ...	Grade Shorthorn	26 Sept. ,,	552	3·6	22·25	
Sally ...	,, ...	23 Sept. ,,	689	3·2	24·6	
Rose ...	,, ...	12 Feb. ,,	424	3·4	16·14	
Whiteflank ...	,, ...	4 June ,,	581	3·7	24·06	
Star ...	,, ...	17 Dec., 1898	615	3·8	26·17	
Roany ...	,, ...	12 June, 1899	537	3·1	18·63	
Ranger ...	,, ...	9 June ,,	497	3·6	22·03	
Ginger ...	,, ...	17 June ,,	411	3·7	17·02	
Biddy ...	,, ...	18 May ,,	588	4·2	27·65	
Bally ...	,, ...	12 Oct. ,,	741	3·6	29·86	

THE DAIRY HERD—*continued.*

Returns from 1st to 31st December, 1899—*continued.*

Name of Cow.	Breed.	Date of Calving.	Yield.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.			
Beauty ...	Grade Shorthorn	14 Oct. 1899	739	3·3	27·31	
Leopard ...	,, ...	17 Oct. ,,	623	3·1	21·62	
Trial ...	,, ...	26 Oct. ,,	782	3·8	33·27	
Duchess ...	,, ...	27 Oct. ,,	787	3·8	33·48	
Pet ...	Grade Jersey ...	6 Oct. ,,	529	3·6	21·32	
Podge ...	Crossbred ...	1 Nov. ,,	662	3·4	25·2	
Russet ...	,, ...	10 Nov. ,,	593	3·6	23·9	
Alice ...	,, ...	13 Nov. ,,	797	3·9	34·8	
Daisy ...	,, ...	21 Nov. ,,	812	3·6	32·6	
Nell ...	,, ...	1 Dec. ,,	531	3·8	22·59	
Damsel ...	Holstein ...	5 Dec. ,,	622	3·3	22·98	With first calf

A glance at the accompanying illustrations of some noted dairy cows and of the Jersey bull, Lord Harry, amongst the dairy herd at the Queensland Agricultural College, will afford evidence that good work has been and is ever being done in the building up of a herd of first-class stock. We are able to give pedigrees and milking performances of the cows for the past five and six months, together with Lord Harry's pedigree. The milking record of the Jersey cow, Stumpy, is especially good, as also are also the milk test and yield of butter. The following are the pedigrees and yields of milk and butter respectively :—

Stumpy (Jersey Cow).
Sire—Effingham Duke.
Dam—Cow by Confidence.
g d Cow by Khedive II.
g g d Cow by Jack.

STUMPY—(Jersey Cow).

Name of Cow.	Date.	Milk.	Test.	Butter.	Remarks.
		Lb.		Lb.	
Stumpy ...	July	746	4·3	35·91	
	August	731	4·4	36·01	
	September... ...	736	4·5	37·09	
	October	727	4·7	38·26	
	November... ...	677	4·6	34·87	
	December	685	4·5	34·51	Still in milk.

Eileen (Jersey Cow).
Sire—Confidence.
Dam—Poddy, by Jack.
g d Cow, imported by W. C. Wentworth.

EILEEN (Jersey Cow).

Name of Cow.	Date.	Milk.	Test.	Butter.	Remarks.
		Lb.		Lb.	
Eileen...	August	315	4·1	14·46	Eighteen days' milk.
	September... ...	687	4·1	31·53	
	October	645	4·3	30·05	
	November... ...	641	4·4	31·58	
	December	612	4·5	30·84	Still in milk.

Plate CLXVIII.

Jersey Cow, "STUMPY"

Jersey Cow, "EILEEN."

DAIRY CATTLE AT THE QUEENSLAND AGRICULTURAL COLLEGE.

Plate CLXIX.

Jersey Bull, "LORD HARRY."

DAIRY CATTLE AT THE QUEENSLAND AGRICULTURAL COLLEGE.

PEDIGREE OF JERSEY BULL, LORD HARRY.

Colour, silver-grey.

Calved November, 1895.

Sire—Reliance.

Dam—Fairfield.

Reliance, by Neat Boy (imp.), (936) Island Herdbook, from Assurance (imp.) Reliance calved November, 1889.

Pedigree of Assurance, imported Jersey cow, bred by Mr. E. Denize, Island of Jersey:—Assurance, by Allow Me (612) from Jennie Fertile (6902), by Count St. George (341) from Lowme (1547), by Sir George (221) from St. Clementaise (917), by Guy Fawkes (251) from Brown Bess (755), by Coffee (233) from Angelica (1738). Coffee, by Imperial (37) from Coomassie (1442); Angelica, by Orange Peel (129) from Garenne (1525).

Assurance was purchased and shipped by Mr. E. P. Fowler for Rev. Ralph Brown, Preston, Victoria.

Fairfield, by Lord Napier II. from Jersey Queen. Lord Napier II., bred by Hon. John Baker, South Australia. Sire, Lord Normanby; great sire, the noted prize-winning bull, Lord Napier (imp.) Dam, the noted cow, Dorcas; g d, Pride (imp.) Pride won two first prizes in England and four in Adelaide, never having been beaten. Jersey Queen, bred by Mr. Dunstan, Victoria; sire, Napoleon; dam, Tulip, by Sir William; g d, Minnie; g g d, Jeanie; g g g d, pure Sumner cow.

LEARNING TO MILK.

When a stranger begins to milk a cow it usually results in some decrease of milk production, though he may be a good milker. The better the cow, the more likely she is to be of a nervous temperament, and the more she is apt to be affected by a change in handling, milking, or surroundings. If the new milker lacks experience it usually results in a permanent shrinkage of the milk yield and early drying off of the cow. But it is necessary that the boys should learn to milk if they are to remain on the farm, and therefore they should be set to learn upon such cows as will naturally dry off soon. Do not give them heifers with their first calf, as the heifer should be kept in milk as long as possible to get her in the habit of giving milk 10 or 11 months in the year. Do not give them hard milkers or kickers, or the uneasy ones which never stand still. That is too much like giving them dull hoes and scythes or other tools to work with, that no man would consider fit to use for a day's work. It is calculated to disgust them with the business and drive them to seek other occupations as soon as they are at liberty to leave home. When it is not practicable to give them such a cow, allow them to partly milk her and then let some experienced milker finish the job, who will be sure to obtain the last drop. —*Mark Lane Express.*

MAIZE-FEEDING IN ENGLAND AND AMERICA.

THE DIFFERENCE IN ITS EFFECTIVENESS OWING TO CLIMATE.

Mr. Harold Leeney, M.R.C.V.S., writing on the above subject in the *Agricultural Gazette* (London), says:—Weight for weight maize appears, in comparison with other corn, to be by far the cheapest. We have always valued a sample of oats (other things being equal) by its weight, and a 44-lb. oat is more than proportionally valuable to a 36-lb. sample. We say, and rightly, that the difference in weight is chiefly in the kernel; so that the lighter one is not only less in gross weight, but of less relative feeding value, because so

much of it consists of husk. If weight is to be our chief guide (after condition as freedom from must and other defects), the clean and heavy maize captures both our eye and hand.

Great working studs have been dependent at times on the management of the forage for their existence, in a different sense from the physiological or digestive. They could not be made to pay as a means of traction unless serious economies could be effected in the diet table. In the hay famine of a few years back it will be remembered that "corn," as our American friends call maize, and maize only, was cheaper than it had ever been before in this country, and everyone was tempted into using too much of it. Correspondents on the other side of the water are disposed to contest our English statements as to this food, and for the excellent reason that they do not get the bad results we do. The extremes of heat and cold, to which we are strangers, demand of American horses and cattle a greater store of live fuel. The laying up of internal fat, of which we complain in maize-fed animals here, is not such an evil there, when weeks of bitter cold follow on the blood-thinning heat of an average summer. In America homing pigeons are most successfully reared and trained on this food—not because it is cheaper, but because our shrewd cousins find it actually best in their climate. In England the bird trained on maize would have a poor chance against one fed on good peas, as we find the latter build the powerful muscles required in flight, while maize adds body-weight and oppresses the breathing apparatus.

AILMENTS FROM MAIZE-FEEDING.

Again, we find that acute indigestion, colic, impaction of the bowels, swelled legs, grease, farcy (so called), are all immediately increased in a stud of horses where the maize ration is increased, and the numbers are sufficient to enable one to get at averages. There is not the same wind-power, nor the hardness of neck, or roundness of rump and quarter to a horse fed on maize that there is in one having the same value, let alone weight, of good Scotch oats. Internal fat is accumulated, and the circulatory as well as respiratory organs labour for want of room when put to the severer forms of exertion.

To cattle and sheep maize is best fed, and with cake or other oleaginous food, plus plenty of bulk in the way of grass, hay, or oat straw—the least harmful, from our English experience. But there will be always greater call for the vet. in a district where it is much used, as fardel-bound or impaction of the third stomach is a common result of any but the most judicious feeding. Given to animals outdoors, and in cold weather, the greatest benefit is derivable from such a heat-giving corn as maize.

Pigs fatted chiefly on maizemeal show the effects of climate, perhaps as much as pigeons. Readers have very likely noted that bacon made from maize-fed pigs in this country melts away in the frying-pan, the fat globules leaving the meshes of connective tissue and filling the pan with "gravy," while the matutinal rasher appears on the table in a very attenuated condition. A dairy-fed animal that has had the usual skim milk and sharps while very young, and barley-meal later on, yields a bacon that is firm in the fat as well as the lean, and only lets free a quantity of fat globules sufficient for its own cooking, or very little more. I have had bacon from America which was fed entirely on maize, and it did not melt away in the pan. Why is it? What answer can we give but "Climate"? Why should the Englishman be prone to get fat at about 40, and the American be tall and thin? Climate. I have ventured to offer the foregoing remarks as a result of long and careful observation, and think we should pay more respect to the opinions of practical feeders who are successful in their own country or district. Are we not too much disposed to rely upon analytical tables, and too little upon the men who succeed as stockmen, but have little to say, and a difficulty in saying it? As illustration of what I have so feebly expressed, I would point to many quite illiterate hands who acquire the art of successful feeding, but "when you ask how it is done" they give you no better explanation than would "soldiers of the Queen."

Our Queensland farm-fed pigs are soft and flabby if fed solely on a milk and whey diet, and the flesh has a white insipid appearance; but fed on crushed maize and cob meal, with abundance of green feed, clean water, and ashes, there is little left to be desired in the appearance and feel of the flesh of our farmers' pigs, and the hams and bacon are excellent.—Ed. *Q. A. J.*

The Horse.

STABLE NOTES.

By W. C. QUINNELL, M.R.C.V.S.

GENERAL DISEASES OF THE HORSE.

Rheumatism.

Rheumatism is inflammation usually affecting tissues of low organisation, such as the fibrous structures of muscles, tendons, sheath, and joints; and, occasionally, rheumatism attacks places of higher organisation—as the heart. The proximate cause of this disease is believed to depend upon a poisonous substance—the accumulation in the body of some product of nutritive derangement. This poison is considered to be lactic acid circulating in the blood.

Varieties.—This disease may be divided into—

(1) Acute.
(2) Chronic.
(3) Muscular rheumatism.

(1) *Acute Rheumatism.*—It is a constitutional fever, characterised by the special tendency to inflammation of certain structures—as the articulations, the coverings or sheaths of the tendons and muscles, the covering and lining membrane (pericardium and endocardium) of the heart. These inflammations are called metastatic, as they have a tendency to shift from one part to another.

Causes.—(*a*) *Exciting*—are exposure to cold and wet, sudden chills, damp and malhygienic conditions. (*b*) *Predisposing*, a constitutional tendency—the so-called "rheumatic diathesis."

Symptoms.—Febrile disturbance is noticed usually before local symptoms. There is sudden and severe lameness with or without swelling of one or more joints. When the attack be severe, or if it be continued, affected parts will soon become hot and swollen. The parts attacked are most commonly the stifle and fetlock, less commonly the hock and knee. When rheumatism arises from exposure to cold or wet, it generally affects the loins or shoulders. On manipulation the affected parts are found to be excessively tender. The temperature is elevated, and may reach as high as 104 to 106 degrees Fahr. The pulse is increased, and, as a rule, is firm and full. The urine is high coloured, scanty, acid on neutral in reaction, containing what is known as hippurates and hippuric acid in considerable quantities. The bowels are constipated. In most cases the heart is affected, and very severe symptoms show themselves. There will be a great amount of tenderness over the region of the heart, and the heart sounds will be found altered in character. It happens in some cases that the inflammation of the joints does not abate, and suppurative symptoms develop; in these cases the fever becomes more severe, and finally the joint is destroyed.

Treatment.—In all cases it is necessary to keep the bowels in a loose state. A mild aperient should be recommended—such as a small dose of aloes, or a saline purgative. Half-a-pint of linseed oil may be selected and repeated according to circumstances.

The abstraction of blood should be prohibited, as it is believed to increase tendency to heart symptoms. Bicarbonate of potassium should be given in full doses three or four days, with spirit of nitric ether. If the temperature

be high, salicylate of sodium given three times daily for two or three days in full doses proves very effective in reducing the temprature. Alkalies, pot. bicarbonate and nitrate in drinking water. When acute symptoms have abated, quinine and arsenic should be given internally. Keep the animal in a perfect quiet and comfortable loose box.

Locally.—Hot fomentation, or flannels wrung out of hot water or oil, applied to parts, and subsequently apply anodyne lotions of opium aconite, or belladonna, which afford much relief. If milder remedies fail, apply stimulating liniments. Firing may be found needful in cases of chronic joint rheumatism. Blisters are of service in subduing the inflammation and the consequent pain and tenderness.

Chronic Rheumatism, as a rule, is the outcome of the acute form, or it may occur as an independent affection.

Symptoms.—This form may exhibit no signs of fever whatever. The inflammation of the joints is of a more persistent character, and more frequently leads to ulceration of the cartilages and destruction of the extremities of bones. In chronic cases the bones in various regions are liable to various pathological changes, and distortions of those are often met with.

Treatment.—When the disease is chronic from the first, the bowels should be kept open by regulation of diet or appropriate remedies; bicarbonate of potassium and iodide of potassium should be administered, and suitable tonics may be given in addition.

Locally.—Stimulating liniments and blisters are useful. Sometimes great benefit may be derived by the application of the firing-iron to the affected parts.

Poultry.

A NEW BREED OF DUCKS.

PROFESSOR H. S. BABCOCK, writing in the *Albany Country Gentleman*, says:—

A new breed of ducks is announced by Mr. T. F. Jager, the secretary of the Water Fowl Club of America. This breed he calls the Blue Swedish duck, and states that it originated "in the extreme northern part of Europe" from, it is asserted, "a cross of the common German farm duck"—whatever that may be—"and the Rouen, having received additional blood from the wild blue teal."

The latter statement about the blood from the wild blue teal may be classed among the statements which are important if true; but I imagine that it would be difficult to establish its truth. Our domestics ducks, except the Muscovy, are descendants of the wild Mallard, the Rouen, and its diminutive counterpart, the Grey Call, preserving the distinct plumage of the wild original. The others, the Pekin, Aylesbury, Cayuga, White Call, and Indian Runner, as well as the common "puddle ducks" of many farms, have varied in plumage from their first ancestor, but they possess the curled-tail features of the drake, and are fertile when crossed with each other. The blue teal is a distinct species, and the introduction of its blood into the Swedish would, in all probability, have resulted in the sterility of the offspring. This is probably an unnecessary attempt to account for the colouring of the Swedish duck made by someone unfamiliar with the principles of crossing. Mr. Jager does not say that this cross was made; he states only that such a claim has been made concerning the origin of

the duck. I think that this claim can be rejected safely, both as unnecessary to account for the plumage as well as being contrary to the general experience of crossing different species.

The name indicates the colouring—blue, probably in the same sense as Andalusian fowls are blue, and also probably from the same cause, the mingling of white and coloured blood. It seems to me that it would be possible to produce a blue duck by crossing the Cayuga and the Aylesbury, though I have never seen the cross made. In fowls a cross of black and white results in barred, speckled, and blue birds, and the same result seems probable if a like experiment were to be tried with ducks. The Swedish duck has a white spot on the neck—like an exaggeration of the white ring on the neck of the Rouen duck. Altogether the plumage would seem to be both novel and attractive.

The Swedish duck is described as very hardy and capable of standing exposure to extreme cold; as very prolific, rivalling the famous Indian Runner duck as a layer; as equal in size to the Aylesbury and Pekin; and as having flesh equal or superior to either of these famous market breeds. The young are said to be very tenacious of life, thriving under conditions which would ensure the certain death of the Pekin duckling. Altogether this is quite a catalogue of excellences; and if the duck fairly approximates to its reputation, it is a very valuable addition to the water fowls of the country.

One cannot help wondering whether it will breed true or not. This has been the bane of blue fowls, and many a breeder has been unjustly condemned because the young hatched from eggs laid by blue fowls have been black, white, and all the shades of blue between these extremes. Blue in fowls is a very unstable colour. It seems to have a very strong tendency to throw back to the original colours from which it was produced. I hope it will not be so in these ducks.

I am especially interested in this new duck as an evidence of the forward movement in the aquatic fancy. People often ignorantly condemn the producers of new fowls, as if they were enemies of the poultry fancy. But the truth is just the reverse of this; they are the fancy's best friends, without whom it would stagnate and die. They put new life into it, by proving the infinite variability and plasticity of fowls, and consequently the indefinite possibility of continued improvement. Duck-breeding, as a fancy, has lagged far in the rear of poultry-breeding, for the lack of the necessary variety among the breeds, and each addition will help the fancy on. And so the breeder of Pekins or Rouens, of Cayugas or Aylesburys, ought to rejoice at the appearance of this newcomer, the blue Swedish duck. Even if it does not prove to be the possessor of all the catalogued merits, it does possess the *sine quâ non* of having a new plumage and of adding variety to the colouring of aquatic fowls. That, of itself, is a sufficient reason for its being. But it doubtless possesses many valuable practical qualities, so that for use as well as for beauty it has a right to be.

TURN EGGS FREQUENTLY.

No matter how eggs may be kept or preserved for future use, they must be turned over at least three times a week, and the oftener the better. This is not to assist in preventing decomposition, but to avoid having the yolks adhere to the shell. The yolk always lies flat on the white and does not sink, as is supposed. It will soon fasten to the shell if too long in one position, the result being that, even when the eggs are good and perfectly free from any taint of decomposition, the yolk, in closely adhering to the shell, gives the appearance of the egg being stale, thus reducing the price.

The Orchard.

FRUIT CULTURE IN QUEENSLAND.

By ALBERT H. BENSON.

MANURING—No. 3.

GREEN MANURING.

Having dealt with farm manures and commercial fertilisers in the second part of this article, we now come to the very important question of green manuring.

The principle of green manuring consists in the growing of a suitable crop on the land to be manured, and, instead of carting it off or feeding on the land, of ploughing it under when it has produced its maximum of growth and contains either in its leaves, stems, or roots the largest proportion of available plant food, so that, when ploughed in, the soil is enriched to the greatest extent and will derive most benefit therefrom.

Queensland soils and conditions are especially adapted to green manuring, and this method of improving land or of maintaining it in a state of fertility is, in my opinion, of vital importance to the agriculturists of this colony.

Green manuring is especially adapted to our local conditions for the following reasons:—

1. In the coastal districts, owing to the more or less heavy rainfall, humidity, and tropical heat, the organic matter of the soil is rapidly decomposed, even in the case of virgin land covered with scrub or forest, and is only maintained by the constant supply of dead leaves, twigs, &c.; but where the land is cleared and under crop, and this natural source of supply is cut off, the organic matter in the soil, together with its attendant nitrogen, is quickly diminished to such an extent that the fertility of the land suffers, and it is unable to produce paying crops.

This is becoming noticeable in lands that have been under cultivation for a number of years in sugar-cane, bananas, and farm crops generally, and it can only be remedied by returning to the soil those ingredients in which it is deficient, and the best and cheapest method of doing this is by green manuring.

2. As soon as land is cleared and the soil broken up, the action of the sun and rain causes the decomposition of the organic matter in the soil to take place more rapidly. Heavy rains also leach the soil of its soluble plant foods more rapidly, and at the same time carry away the smaller particles of organic matter; hence the greater necessity of maintaining the supply of organic matter.

3. The depletion of organic matter from the soil renders the soil less easily worked, as the soil becomes more compact and less friable. This has the effect of retarding the free passage of air and moisture through the soil, and, consequently, the disintegration of the soil proceeds less rapidly, and insoluble plant foods present in the soil are more slowly rendered soluble. The deficiency of organic matter also lessens the power of the soil to retain moisture, and this in itself is a very important consideration, especially in the drier parts of the colony.

4. The heavy soils of the tablelands could be rendered more friable and easier to work by the judicious use of green manures, especially those that are deep-rooting, as they tend to burst up and lighten the soil, and thus permit of its being worked at a cheaper rate. This has been especially noticeable at both the Hermitage and Westbrook Experiment Farms, where the growing of cow peas has had a very marked effect in improving the texture of the soil, which can now be worked during a dry spell when adjacent soil is often too hard to plough.

5. Green manuring, in addition to supplying the soil with organic matter and nitrogen, also provides a considerable quantity of other plant food, such as phosphoric acid and potash, in an available form for the succeeding crop. The green crop, grown as a manure, extracts the potash and phosphoric acid necessary for its own development, and stores them up in its roots, leaves, and stems, so that, when returned to the soil, this plant food is in an available form and within easy reach of the succeeding crop. The most suitable crops for green manuring usually produce a large amount of roots, and these roots penetrate the soil to a considerable depth in search of plant foods so that when they are returned to the soil this plant food, instead of being in the soil in an unavailable condition, is in a condition to be readily assimilated by the succeeding crop.

6. When land has become thoroughly worn out by the continuous growing of one particular crop, such as sugar-cane, it requiries resting, not by means of a summer fallow, which does more harm than good in the coast districts, but by being planted to a totally different crop and allowing the same to occupy the soil for one or two years, and to be then ploughed in. Perennial leguminous crops, such as the small Mauritius bean and Narico bean, which have been proved to stand two winters at Redland Bay, are especially suitable for this purpose. Land so treated gets a thorough rest, and it is the nearest approach that can be obtained to the conditions that produce our scrub soils, and to which their fertility, when first brought under crop, is largely due.

7. By manuring the crop—such as cow pea—that is to be grown as a green manure with a mixture of phosphate and potash manures, you supply the soil with a complete fertiliser, and, at the same time, obtain the best results. The phosphoric acid and potash produce a heavy green crop and stimulate a vigorous root growth, so that when the green crop is returned to the soil the soil receives the benefit of the extra amount of organic matter and nitrogen produced by the special manuring, as well as of the special manures themselves which have been retained in the soil by the green crop, and are available for the succeeding crop.

The method of improving land by means of green manuring is by no means a new one, though it is only of comparatively recent years that its value has been fully appreciated, as it has been in use in older countries for a long time. In older countries its use was confined to the growing of catch crops of mustard, rape, &c., which were ploughed under, as it was found that a systematic rotation of crops, combined by the return to the soil of all farm manures, was usually sufficient to maintain a sufficiency of organic matter in the soil, as the conditions prevailing were not so destructive of organic matter as those prevailing under tropical and semi-tropical conditions. The discovery that leguminous plants had the power of assimilating nitrogen direct from the air, and of fixing the same by means of the nodules on their roots, thus doing away with the necessity for applying nitrogenous manures to such plants, has, however, brought the question of green manuring by the use of such plants into prominence; as it has been clearly demonstrated, both by science and practice in all parts of the world, that this is the cheapest way of obtaining the supply of nitrogen that is required as plant food for the various farm crops. This discovery has, therefore, given a great impetus to green manuring, and, from the experience already gained by its use in this colony, there is every reason to believe that it will be used much more extensively in the future than it has been in the past.

Crops Suitable for Green Manuring.

Although many crops have been recommended and grown for green manuring, none, in my opinion, are so suitable for our local conditions as the following varieties of the pea family. As previously stated, many plants of this family have the power of assimilating nitrogen direct from the atmosphere and of storing it up so that it is available for the use of the succeeding crop. The following pulses thrive remarkably well in this colony, as they are vigorous

growers, producing a large amount of leaves and vines. They have also a great quantity of roots, covered more or less with nodules, which occupy the whole of the surface soil and penetrate deeply into the subsoil, thus enabling the plants to withstand heat and drought well, and rendering them good foragers for inorganic plant foods.

Three of the varieties have stood over two winters at Redland Bay without any appreciable injury, but the others are annual.

Cow Pea.—There are several varieties of this pulse, but for green manure none are superior to the black and clay-coloured varieties, both of which are vigorous growers and produce a large amount of vines and leaves. The white cow pea (the black-eyed pea of the States), though an exceedingly good vegetable, both fresh and dry, is unsuitable for manuring, as, though it produces a heavy crop of beans, it only grows a small quantity of vine. Cow peas can be sown as soon as danger of frost is over, but they do not make a good growth till the soil is warm. Under favourable conditions, the crop is fit to plough in from ten weeks to three months after planting, even less in more tropical districts, and rather longer on the Downs or in the drier parts.

The seed can be either sown in drills or broadcast, the former being preferable, as the young plants can then be kept clean till they have taken full possession of the ground. Sown in drills 3 feet apart, and the seeds 15 inches apart in the drill, will take from 12 lb. to 16 lb. of seed to plant an acre if single seeds are sown. If sown broadcast, from 1 to 2 bushels an acre will be required.

Mr. Brünnich estimates that a crop of cow peas of about 10 tons to the acre will produce 150 lb. of nitrogen in eight weeks in Northern Queensland, which is worth, at the present price of organic nitrogen (5½d. per lb.), £3 7s. per acre.

Velvet Bean.—As I have already given a description of this bean in this *Journal*, it is needless to go into detail. This bean is a rapid grower, produces an enormous quantity of leaves and vines, and has given as high as 35 bushels of beans to the acre at Redland Bay. It will not stand the winter, but dies off on the approach of cool weather. It should always be planted in drills, and should not be sown closer than 4 feet by 1 foot when, if single seeds are sown, 22 lb. will plant an acre. This bean is now very largely grown in Florida, where it is used both as a fodder plant and as a green manure, and is considered by many competent authorities to be the most all-round valuable plant introduced into that State for many years. The velvet bean is not attacked by weevils, nor are the pods destroyed by the sucking bugs that do so much damage to cow peas and many other beans. Under favourable conditions, a crop of velvet beans will produce 20 tons to the acre of green manure, which, according to an analysis made by Mr. Brünnich at the Queensland Agricultural College, Gatton, will yield about 10 lb. of nitrogen to the ton, or 200 lb. to the acre, worth, at the present price of organic nitrogen—namely, 10s. per unit or 5½d. per lb.—about £4 9s. per acre.

White's Perennial Cow Pea.—Samples of this bean were obtained by me from Fiji and Cairns, and planted at Redland Bay. It is a true cow pea, with small brownish seeds; a very strong grower, producing more vines but less leaves than any other cow pea; a rapid grower; said to be perennial under tropical conditions, but did not stand the winter at Redland Bay. This variety produced a large number of pods, but the bulk of the beans were destroyed by sucking bugs, which were especially partial to this variety. I am not aware of any analysis having been made of this variety, but should say that it will be similar to that of the black or clay-coloured varieties.

Small Mauritius Bean.—This bean, which has been previously described in this *Journal*, is a very strong grower, producing an enormous quantity of leaves and vines, and forming a dense mass of growth which chokes out all weeds. It is not a rapid grower at first, so that it is always advisable to plant it in drills, but, as soon as it begins to run, it grows very fast. It has stood two winters at Redland Bay without injury, and has produced a large quantity of seed. It has

enormous roots for a bean, and the roots are covered with nodules, some of which are of large size. When allowed to occupy the ground for any length of time, it sheds a great number of leaves, so that on lifting up the vines it is a common thing to see a covering of at least 2 inches of rotting leaves on the ground. This bean is very suitable for spelling worn-out land, as previously recommended, and I believe that its use for this purpose—namely, allowing it to occupy the land for a couple of years—will be found to be a most effectual way of renovating such soils. This bean is well spoken of by the officers of the Colonial Sugar Refining Company, and is said to be very rich in nitrogen, but an analysis made by Mr. Brünnich in 1892, from plants eight weeks old, showed that the produce was only 10 tons to the acre, containing 67 lb. of nitrogen, or less than half the percentage of nitrogen contained in cow peas of the same age. Ten tons of green manure is a small crop for this bean, and the analysis was evidently taken before the crop was fit for ploughing in. In the Southern part of the colony this bean does not produce any pods till it has been planted six months, and it takes at least two months to cover the ground—in fact, at two months old, it is only commencing to grow properly. A series of analyses of this and other pulses suitable for green manuring, taken at different periods of their growth, is badly wanted, as we have no reliable up-to-date data to go on. I am glad to say, however, that the Department's chemist hopes to make this want good at no very distant date.

Mauritius Beans.—There are several varieties of this species of *Mucuna*, all very similar, but differing somewhat in the colour of the seeds, time of ripening, and prolificness. The black Mauritius bean has been already described in this *Journal*, but two varieties of it that have been grown at Redland Bay are comparatively new. One of these produces a long raceme of white flowers, and the bean is of a dirty yellowish white colour. This variety is a more prolific seeder than the black and, if anything, more vigorous in growth. The seed of the other variety is somewhat similar in colour, but not in shape, to the velvet bean, but the growth and flower are similar to the black variety. These beans are strong growers, producing a large amount of leaves and vines, which die off in the Southern part of the colony when cool weather comes. They are largely grown by the Colonial Sugar Refining Company for green manuring, and are spoken highly of.

The Poor Man's Bean.—This is also a perennial bean, but inferior as a green manure to the small Mauritius. It is a rampant grower, producing a great quantity of vines, but not so much leaf as several other varieties already described. Although it stands over the second season, it does not make a satisfactory growth, but is apt to become patchy and thus allow weeds to grow. This bean makes an excellent fodder, much relished by stock, and increases the flow of milk in the case of dairy stock. It will make a good change crop, and will probably pay best to feed off, as by that means the land will be improved by the roots, the fallen leaves, and by the excreta of the animals which have consumed it.

The Narico Bean.—This bean has also stood over the winter at Redland Bay, and produced a large quantity of leaves, vines, and seeds. It is a variety of *Dolichos Lablab*, the same family to which the poor man's bean belongs, but is superior to that variety as a green manure. Like the small Mauritius, it is suitable for spelling land. No analyses of this and the preceding variety have been made that I am aware of, so that it is impossible to say what their manurial value is, but from its growth and general habits the Narico bean should prove to be a good nitrogen producer.

There are many other leguminous crops suitable for green manuring, such as field peas, lupine, vetches, crimson clover, &c., but I do not know of any that are as suitable to Queensland conditions as those already given, as they are all suitable to the climate, and are all vigorous growers, producing their most rapid growth during hot humid weather, when many other varieties of leguminous plants will not thrive.

APPLICATION OF GREEN MANURE.

Owing to their rank growth, many of the crops recommended for green manure are difficult to plough in. In the case of cow peas, velvet beans, and Mauritius beans, this difficulty may be overcome by allowing the crop to remain on the land till winter, when it dies down and can be easily turned under. This will not entail any serious loss of nitrogen, but will not have as beneficial an effect as ploughing in green in soils that are of a heavy nature where it is advisable to bury as large an amount of green matter as possible, in order to obtain the best effects mechanically in the soil. Allowing the crop to rot on the land also entails a loss of time, so that, where the land is required for the succeeding crop at an early date, the manure should be ploughed in green. The exact stage at which to plough in is when the plants are in full growth, just when the seeds are beginning to form. If ploughed in earlier there will be a loss both of nitrogen and in bulk, and if allowed to get too ripe there is a loss of bulk—the crop is more woody and consequently more difficult to turn under, and takes longer to rot in the soil.

Where the crop is very heavy it is advisable to roll it before ploughing in, if possible to get horses through it; and then turn it under by means of a plough having a very large and sharp rolling coulter and cutting a 14 to 16 inch furrow 4 to 5 inches deep. A strong sulky plough is the best that can be obtained, as it will cover better than any plough with which I have had experience.

In orchards, the use of green manure is better confined to the growing of one or two rows of beans between the rows of trees whilst the trees are young; in old orchards it is not advisable, as, should a dry time come, the green crop will take the moisture required by the trees, which will suffer in consequence. In the case of young trees, however, it will do no injury to the trees, and the crop can either be allowed to remain on the land and rot, and be lightly ploughed in during the winter, or it may be cut and used as a mulch round the trees themselves.

The growing of one or two rows of pulses between the rows of trees in the orchard has also a very good effect, especially on sloping ground, of preventing the washing of the land during heavy rains; the rows of beans being, of course, set across, and not up and down the face of the slope.

Where a quantity of stock is kept, the feeding off of crops on the ground is an excellent way of manuring the land; and the results, though not equal to green manuring, are still satisfactory, and an immediate return is obtained from the stock instead of waiting for the succeeding crop; the difficulty of ploughing in is also done away with. After green manures have been ploughed in, it is not advisable to allow the land to remain fallow for any length of time, as this will entail more or less loss, but the succeeding crop should be planted as soon as the green manure is sufficiently rotted to admit of the land being worked.

ROADSIDE FRUIT IN EUROPE.

THE cultivation of fruit trees along the highways of France is being extended each year. The Government having first set the example, the communes in certain departments adopted this practice as a source of revenue, so that now roadside fruit cultivation has become an important branch of national industry. It is not, however, only in France that fruit trees have been planted along the roadside. The United States Consul at St. Etienne says that in Germany, Belgium, and the Duchy of Luxemburg the system has been greatly developed, giving satisfaction to the State as well as to local interests. On the Wurtemberg roads, for instance, the fruit harvest from this source produced in 1878 over £40,000, and last year the returns had more than trebled. The annual revenue derived from the national roads of Saxony planted with fruit trees rose from £1,800 in 1880 to £8,400 in 1892, furnishing a total sum of £68,000 for the 13 years. In Belgium, according to the statistics of 1894, over 2,875 miles of roads were planted with 741,571 fruit trees, which furnished the large sum of

£400,000. In France the production of fruit trees is estimated at £12,000,000. In Westphalia, in the Duchies of Baden and Saxe Weimar, in Alsace-Lorraine, Switzerland, &c., the employés of the Administration of Roads and Bridges and the road supervisors are instructed in fruit culture. In some of the southern departments of France the roads are bordered with cherry-trees, producing the small fruit called *merise* (wild cherry), much appreciated for making wine *sui generis*, preserves, or even alcohol. In the Touraine, plum-trees predominate, while in the Allier the walnut-trees transform the roads into shady walks. In Auvergne the chestnut-tree flourishes; while in Normandy place is naturally given to the apple-tree. Some 20 years ago the picturesque roads of the north-east of France were lined with stately poplars; but although ornamental, their roots went far and wide, rendering the adjacent meadows sterile, and ploughs were continually stopped by offshoots lying almost at the surface of the soil. The farmers appealed in such strong terms that the communes decided upon the fall of the poplar, and soon axes and saws were brought into requisition, and the roads cleared of these trees in favour of the humble but more useful *mirabelle* (small plum), to the great satisfaction of the villagers. Thousands of baskets of this fruit are sent to Paris daily. Some 30 years ago the distillation of the mirabelle was unknown in the country districts—the people plucked it as food for their pigs; but to-day they have learned to make more profitable use of it. They distil it in large quantities, and find a ready market for it. A quart of this alcohol, slightly perfumed, sold five or six years ago for only about 10d. or 1s. 3d. To-day it brings not less than 2s. or 2s. 6d., while in Paris the best kind cannot be obtained under about 4s. 3d.—*Journal of the Society of Arts.*

PICKLING OLIVES.

In reply to a question by a correspondent of the *Pacific Rural Press*, that journal says:—We cannot give an eight-day formula. Quick extraction of the bitterness requires a strength of lye which destroys the pulp of the fruit. The following is a careful statement of the pickling processes by F. I. Bioletti, of the State University, and it is the best outline of the subject we know of:—

Pickling.—The successful production of pickled olives is a matter of experience, and depends almost altogether on the individual judgment and skill of the producer. No method can be given which is suitable to all cases, and the best method must be modified according to the nature of the olives to be treated. The following scheme, therefore, is to be considered as a mere outline, to be carefully adapted and modified by the operator at each stage of the process:—

Lye Process.—1. Place the olives in a solution composed of 2 ounces of potash lye to 1 gallon of water, for 4 hours. Repeat this once, or twice *if necessary*, to sufficiently remove the bitterness. If the olives are soft at first, or disposed to soften rapidly in the lye, add 4 ounces of salt per gallon to the lye solution.

2. Rinse the olives thoroughly and replace the lye solution with fresh water. Change the water twice a day, until the potash has been removed from the olives, as judged by the taste.

3. Replace the water with brine composed of 4 ounces of salt to 1 gallon of water and allowed to stand 2 days.

4. Put in brine of 6 ounces of salt to 1 gallon of water for 7 days.

5. Put in brine of 10 ounces of salt to 1 gallon of water for 2 weeks.

6. Put finally into a brine containing 14 ounces of salt to 1 gallon of water.

Hints on Handling.—In order to make this process a success the following considerations should be kept in view:—

1. Great care should be taken not to allow the olives to come in contact with anything that will injure their flavour. The vats or other receptacles used for pickling should be perfectly clean, odourless, and tasteless. Earthenware is the

best material, but it is usually cheaper and more convenient to use wooden receptacles thoroughly treated with boiling water and soda until they are sterilised and all taste of the wood removed. Any wood (such as pine) with strong taste should not be used. The vats should be provided with a removable wooden grating, fastened 1 or 2 inches from the bottom, and a close fitting floating wooden cover to prevent access of air, which spots the fruit. On top of the vats should be placed a cover of thick cloth or of wood to exclude light and dust. Each vat should be provided at the bottom with a wooden spigot for drawing off the solutions.

The thickness of the layer of olives should not be more than 2 feet, or less with soft varieties.

2. Only the very best of potash lye should be used. Some of the brands of lye are so impure that it is impossible, without a chemical analysis, to tell within 10 cent how strong the lye solution actually is when made up. "Greenbank Lye" has been found the most reliable, and may be considered as 100 per cent. pure when making up the solution. The length of time which the olives should be left in the lye, and the number of times the lye should be renewed, can only be determined by experiment for each variety and each locality. The object is to extract the tartness of the olive, and at the same time to soften the skin sufficiently to allow the tart or bitter substances to be soaked out in the subsequent treatment with pure water. The tougher and thicker the skin of the olive and the more intense the tartness, the longer must the lye treatment be continued. The lye is sometimes made twice as strong as recommended above, and the treatment correspondingly shorter, but the results are not so good. Just enough lye solution should be used to exactly cover the olives, and occasionally, during the soaking, some of the solution should be drawn off below and poured on top to insure an equal treatment of all the fruit.

3. Only the very purest water should be used, both for the lye solution and for the subsequent soaking. Canal and river water, or any water that contains a great deal of organic matter, should never be used unless it is practicable to boil it first. Distilled water, such as can sometimes be obtained by condensing the waste steam from a boiler, is the best, both on account of its purity and its greater extractive power, provided, of course, it be free from oily flavours The length of time during which the soaking in pure water should be continued varies very much in accordance with the character of the fruit. If the olives are firm and show no signs of becoming soft it should continue until the tartness is sufficiently extracted. This will vary usually between ten and twenty days. The moment that the olives begin to show signs of softening, however, they should be placed in weak brine, even though the tartness has not all disappeared. What remains can then be extracted by the brine, which should be changed two or three times, as may be necessary. It is not necessary to change the brine quite so often as the pure water, once in two days being generally sufficient.

Salting.—If the olives are soft at first, before treatment with lye, or if they are of a kind that softens rapidly in the lye, it is necessary to use brine from the beginning, either immediately after treatment with lye or, in extreme cases, with the lye. This method, suggested by Professor Hilgard, has been used with marked success. The lye solution in this case should be made by adding 2 oz. of lye and 4 oz. of salt to each gallon of water. As the lye acts much more slowly when used in combination with salt, it may be allowed to stay on the olives for a longer time without injury, eight to twelve hours, or even more. In this way the lye solution tends to soften and swell the olives; the brine counteracts this and tends to harden and shrink them. The shrinkage, which occurs when brine is used from the beginning on naturally soft olives, is not a disadvantage if not carried too far, as such olives are generally too watery to be palatable or to keep well. They can, moreover, if shrunk too much, be made plump again by a few treatments with pure water before being put finally into brine.

The first salting must be done very gradually and carefully in order to prevent shrinkage and wrinkling of the fruit. For this reason gradually increasing strengths of brine must be used as described, and the olives left long enough in each to be thoroughly penetrated.

In all these operations no sign of scum or slime should be allowed to accumulate on the olives, the vats, or the covers. This is of especial importance during the treatment with plain water. On the first sign of sliminess around the sides of the vats, where it appears first, they should be emptied and thoroughly brushed and scalded before replacing the olives.

Pure Water Process.—The best pickled olives are made without the use of lye, but this process is only practicable with olives whose tartness is easily extracted, and where the water is extremely pure and plentiful, and even then it is very slow and tedious. It differs from the last process only in omitting the preliminary lye treatment. The olives are placed from the beginning in pure water, which is changed twice a day until the bitterness is sufficiently extracted. This requires from 40 to 60 days or more. The extraction is sometimes hastened by making two or three shallow longitudinal slits in each olive, but this modification, besides requiring a large amount of expensive handling, renders the fruit peculiarly susceptible to bacterial decay and softening. Altogether, the pure-water process cannot be recommended for California, as it is too expensive and uncertain.

Green Pickles.—Green pickled olives are made by essentially the same processes as are used for ripe pickles. The extraction of the tartness requires the same care and the same close adaptation to peculiarities of different varieties as already described. The olives are pickled soon after they have attained full size, and before they have shown any signs of colouring or softening. They contain at this time comparatively little oil, and are every way much inferior to the ripe pickles in nutritive value. They are not a food, but a relish. They are rather more easily made than the ripe pickles, as there is less danger of spoiling. There is, however, very little market for any but the largest sizes.

Grading and Sorting.—It is extremely important that all the olives in each lot of pickles should be as nearly as possible uniform in character, in order to facilitate the process of pickling, and to produce an attractive appearance. Olives of different varieties, and even those of the same variety from dissimilar locations, should never be mixed. The first sorting is done while gathering, and the under-ripe, over-ripe, and injured fruit separated from that which is to be pickled. The good fruit is then graded, by means of a mechanical grader, according to size. In this way the olives are separated into different lots, which will each contain fruit on which the different processes of pickling will act uniformly. A grader adapted to handling soft fruit, that will not bruise the olives, must be used. After the pickling process is finished there will often be a distinct difference of colour between different olives of the same lot. Another sorting according to colour is then advisable. This must be done by hand, and either two or three colours may be separated, dark and light or black, medium and greenish, according to variety.

Apiculture.

PRACTICAL BEE-KEEPING.

By H. R. STEPHENS, Busy-Bee Apiary, Toowoomba.

SUPERS.

WHERE the bees are strong, supers should now be filling, either f extracted or comb honey. The latter is a very attractive form of obtaining hone as it is quite a pleasure fitting up the supers with the nice clean one-pie section boxes, and is the method I would usually advise for those who mere wish to have some honey for the table occasionally. With this method, als no extractor is required and no straining or bottling is necessary—as the co honey section box is removed directly from the hive to the table.

COMB HONEY SECTION-HOLDERS.

There are several means of getting comb honey stored; but as the sectio holder is one of the best, I will confine myself to a description of a go pattern of one that has been tried practically in my apiary. A super for co honey is just half the depth of one for extracted honey—viz., $4\frac{3}{4}$ inches—an contains six section-holders lengthwise of the super, or eight if placed tran versely; and each holder contains 4 or 3 one-piece sections, making 2 dozen the super.

Now, to prevent the bees attaching the section boxes all together, th pieces of wood are placed between the holders, and are called separators; b these do not lie directly against the section box, but about three-sixteenths an inch away to permit of the bees building the comb and storing honey. The spaces are termed insets or bee-spaces; and it is desirable to permit the be free access to all parts of the super.

"DAISY" FOUNDATION FASTENER.

For comb honey, an appliance for fixing the foundation in the section boxe previous to giving them to the bees is necessary, and the "Daisy" is about th best and does the work perfectly, though for one or two colonies of bees simpler means would answer well enough. It is best to give bees whole shee of base in the section boxes, as they generally work better when thus provided If any who read this article wish for further details about the care of bees description of apparatus, I shall be pleased to give them, as I really think thi for business and pleasure, the keeping of the honey bee, from one colony or on hundred, beats most occupations, and is interesting right through, from th tongue that gathers the nectar to the sting that protects it when stored a honey.

THE QUEEN BEE.

The queen is the most important bee in the hive, as without her a colon would soon die out. Therefore the bee-man must give most attention to he majesty, who is, however, not by any means an exacting lady, as, when there is good prolific young queen in a hive, she goes about her business of layin eggs, both worker and drone, without much trouble or attention being require by her. But, in looking at bees, it is the rule to try and see worker-eggs, an also to keep an eye open for the queen. Seeing her is not necessary if egg are present; but immediately there is an absence of worker-eggs in the colo (when the other colonies have them) your watchword must be—*Kuberda*. Take care, or you will lose your bees. I emphasise the importance of eggs being present in the hive, as on this condition hinges the success of bee-keeping

Where the winter is cool, as at Toowoomba, the queen ceases laying during the months of June and July, and then, of course, we must depend on the queen alone to renew the strength of the colony in the spring, as, naturally, if the queen is lost when there are no eggs in the hive, the bees are unable to raise another queen, having no worker-eggs wherewith to do so, whereas in the summer, when eggs are plentiful, a new queen can be hatched in nine or ten days.

FERTILE WORKERS.

An exception to the foregoing is when one of the worker bees of a queenless hive takes upon herself the duties of the queen, and starts laying eggs, but these eggs only hatch into drones, and are therefore useless for preserving the existence of the colony. If several eggs are deposited in cells, instead of one a queen lays, a fertile worker may be suspected.

OUT-APIARIES.

The apiaries that are established in the garden adjoining the dwelling-house are not invariably the source of income to the owners that others located according to the prevalence or otherwise of flowers in the neighbourhood usually are. Darwin said, "No bees, no flowers; no flowers, no seed." Bee-keepers ignore the seed question, leaving that to the seed-raiser, whose ally they are; but they know that it is equally true with Darwin's remarks, that no flowers, no honey; and few flowers, little honey; hence all locations where a profusion of flowers is known to be possible in due course are just the ones to be considered ideal spots for temporary apiaries.

Permanent sites for continued heavy crops are rare, except as in America, where the basswood trees, the best of all honey-producers, are growing in abundance. Our limes, though good honey-producers, are nowhere in such numbers as to make a heavy crop of honey from that source alone a certainty. The only crops upon which we can count in this country [Great Britain] for any amount of honey are turnip, coleseed, mustard, charlock (in my district this has every appearance of a distinct crop), with white and alsike clover and sainfoin as main crops, followed by brank or buckwheat and heather.

The above succession of flowers cannot be obtained in any district; the best are usually those areas bordering on the fruit-growing centres, and having seed-farms, while being well supplied with flowers of one of the main honey crops, such as clover or sainfoin.

Permanent locations for honey-gathering being really out of the question, the honey-producer, to do well, must copy bee-keepers abroad, and take his bees to the flowers. I have no hesitation in saying that it pays to move bees to pastures new. Fear of losing swarms deters many. Mr. McNally, one of Scotland's great apiarists, writing in the *Record* a short time since, said:—"For a good many years past I have run an out-apiary on the non-swarming system, and, taking one season with another, have so managed that not more than 4 per cent. of the stocks in it have swarmed. Even this might have been prevented; but, as often happens, one is so busy in spring-time that the bees are overlooked. The out-apiary consists mostly of hives on the storifying or tiering-up system, with the plain ten-frame body-box. The bees are wintered on the whole ten frames, and as soon as the hive becomes crowded in spring (usually the first week in June) it is supered. About a week afterwards an inspection is made; and if the bees have taken to the super, the hive is then lifted off its stand, and a shallow frame body-box of ten frames, fitted with comb foundation, guides ½-inch deep, is placed under. If the weather happens to be warm at the time, the hive is wedged up ½-inch in front with a couple of small stones placed at the front corners. It remains thus during the whole of the honey season, or until there is any danger of robbing. As soon as the sections on the supered hive are seen to be about half-filled, the rack is lifted up and another similar rack placed beneath it."

Mr. McNally's plan is to work two crates, or racks, of sections on a at time. He removes the top one when filled, and raises the remaining on give another empty one beneath. In this way he proceeds to the end of season. If there should be a check in work by bad weather, the bees leave supers and build comb in the empty frames below the brood-combs; there swarming is prevented by giving plenty of room above and below, and by all ing plenty of ventilation.

Singularly in contrast is the above system of tiering with that reported the *British Bee Journal* by another Scotch bee-keeper, who this season ha swarm that gathered him 202 lb. of surplus honey. He says, after giv details regarding the treatment of the swarm:—"Now for the racks of secti They each hold 21 sections, and those used had glass back and front observing the progress made. It was a charming sight to see five racks these on the hive at one time during August crammed with bees. In ev rack but one I used full, or nearly full, sheets of foundation." The follow tabular statement given in the contribution referred to is most interesting:—

Racks of Sections put on.		Sections taken off.	lb.
1st	July 4th	July 24th	24
2nd	„ 8th	„ 31st	20
3rd	„ 14th	Aug. 5th	53
4th	„ 18th	„ 14th	42
5th	„ 24th	„ 30th	21
6th	„ 31st	Sep. 15th	21
7th to 10th	Aug. 20th		
Total Sections on, 210.		Total finished	181
Add 12 partly finished sections			4
Three frames weighing 4, 6, and 7 lb.			17
Total Surplus			202

—*Farmer and Stockbreeder.*

Horticulture

SPRAYING TALL TREES.

By PHILIP MAC MAHON,
Curator, Botanic Gardens.

In the application of kerosene to trees, whether in the form of emulsion otherwise, experience points out that three things are essential:—1. That kerosene shall be applied equally to every portion of the foliage, and, of cour to the stem as well. There is no use in spraying portions of a tree, and th running away with the conviction that you have made it uncomfortable for insect pests there abiding. It is like dipping one side of a bullock for tic 2. That the kerosene should be deposited on the foliage as a thin film. In case of emulsion this will not be secured unless extraordinary attention is pa to the thorough mixing of the ingredients. It must not be forgotten that soap-laden water is merely a vehicle for the distribution of the kerosene, an that a tree may appear to the eye to be well sprayed when, as a matter of fa it has only had a good drenching of soap and water, with kerosene in spo The kerosene must not be present in sufficient quantity to cause serious injur

Five years ago the following memorandum was printed on the cyclosty here, and a copy handed to those of the employés who evinced any interest the matter. They are practically the same remedies which have been in u ever since. The frequent and liberal use of these has made a difference in

Plate CLXX.

SPRAYING TALL TREES, BRISBANE BOTANIC GARDENS.

quantity of insect and fungus pests in these Gardens, which can only be appreciated by a person who has seen them from day to day and observed them critically :—

Botanic Gardens,
Brisbane, 12-3-95.

MEMO. OF INSECT AND FUNGUS REMEDIES.

1. *Kerosene Emulsion.*—2 quarts soft soap, 1 gallon rain water, 2 gallons kerosene. Boil soap and water, then add to kerosene. Pump with syringe (nozzle under water) until mixture forms a kind of cream. When about to use, add 27 gallons rain water. Spray finely, wetting every part —For scale.

2. *Resin Wash.*—5 lb. caustic soda, 15 lb. resin. Mix; cover in boiler with water; boil 3 hours. Dilute by degrees to 100 gallons. Strain through canvas. Spray finely; wet every part.—For scale.

3. *London Purple.*—1 lb London Purple. Thoroughly grind fine. Mix with 100 gallons water; keep stirred; spray well.—For caterpillars, aphis, &c.

4. *Bordeaux Mixture.*—Mix 6 lb. bluestone (sulphate of copper) in 40 gallons water. Mix 4 lb. fresh slaked lime in 6 gallons water When cool, slowly pour lime mixture through piece of canvas into bluestone mixture; stir constantly; spray.—For fungus, lichens, &c.

5. *Eau Celeste.*—Mix 1 lb. bluestone (sulphate of copper) in 2 gallons hot water. When cool, add 1½ pints commercial ammonia (strength, 22 degrees Baumé); keep tightly corked. When using, add 20 gallons water; spray.—For fungus, lichens, &c.

In the case of plants with tender foliage further dilution may be necessary. This must be decided at the time of using.

Recently I have been endeavouring to solve the problem of spraying the very high trees which are to be found in the Gardens. These are chiefly infested with the Pink Waxy Scale, the well-known *Ceroplastes rubra*. Personally I am not of the opinion that this scale will ever prove such an injurious pest as some of the scales undoubtedly are to the gardener, but at the best it is ugly, and must, of course, largely interfere with the growth of trees upon which it places its affections, and it is as well to fight it earnestly. Mixture No. 2 above, we have always found to be the best for this scale. The illustration will show how we are arranging to lift the point of the hose into the high trees in such a manner as to wet every part of the foliage. The idea is that of an immense fishing-rod balanced across a fulcrum in such a way that the man on the ground may swing the top about with the greatest ease into the exact position required.

The illustration shows our first trial in which the wagon used for the repair of the tram-cables was made use of, but now a light pine pole 20 feet high and 3 inches square at the base, slightly tapering to the top, is stepped into an ordinary cart, and kept upright by means of guys fastened to the cart itself.. To the top of this pole is secured a pulley, and by means of this a long bamboo pole or "fishing-rod" is run up with the hose attached. It is easily swung round in any direction, and can with the greatest ease be guided to within half-an-inch of any small object in the top of a tree up to 50 or 60 feet high.

The pump used is the Doncaster spray pump. It requires a trifling alteration to fit it for this work.

I have reported to the Department on the possibility of spraying by steam-power, in which I am a great believer. I am fully of the belief that the application of this means of raising the nozzles into the required positions, combined with steam-power for forcing the spray, will solve the difficulty of spraying effectually the very largest trees, and those most difficult to be reached by any other means.

The Doncaster pump, by means of an attachment, distributes the kerosene mixed with the water straight from the tin without any previous mixing. It works well, but demands much care and a knowledge of the trees you are dealing with.

Tropical Industries.

COFFEE CULTURE IN QUEENSLAND—No. 2.

By Mr. HOWARD NEWPORT,
Instructor in Coffee Culture.

THE NURSERY.

The first thing that demands our attention is the site for the nursery. This may have been chosen before, and the germinating beds made there; but if the seed has been germinated near the house, or in any handy bit of land, the nursery site must be decided upon, and the work of felling (if necessary) and clearing, stumping, and digging up set in hand.

In selecting the site of the nursery the proximity of water is an important consideration. Few works are more expensive than the transport of water, and water will be necessary more or less during the life of the seedling and plant in the nursery, and this during the driest part of the year. The next point is the proximity of the future clearing to be planted up, for if the plants are taken out with earth around each root, as is safest and best, the transport of the seedlings to the field will be found a heavy and tedious item also. Having thus roughly located the place where the nursery must be, the ground must be examined. Steep land is no special disadvantage, except on the score of cost, as the beds have to be flat. Cutting and terracing is tedious and expensive; therefore, if flat land is available select it by preference. For a surface soil a deep-chocolate will be found nearly always good—a black soil will make a good nursery, but frequently it is shallow and denotes a heavy subsoil. The kind of soil to look for is a rich leaf mould, and if possible one that has a depth of at least 1 foot and 18 inches by preference, with a light porous subsoil.

Since in a nursery the top soil is practically all that is required—the plants seldom being allowed to grow more than 1 foot either above or below the surface—the subsoil is not of so much consequence as in the clearing where the plants have to spend the rest of their life. A free soil, the richer the better, is absolutely necessary, however, for a depth of 1 foot. Below that slabrock or hard, stiff clay is to be avoided, but a free porous subsoil is always an advantage, the more especially as a few beds of plants may have to be left for stumps next season. For the same reason avoid land that may be so near a creek as to be flooded, for, though the use of the nursery itself may cease with the commencement of the rainy season, a sudden flood may come earlier than usual, and in any case would wash away just the surface soil that is needed.

Having then decided on the spot to be made into a nursery, if scrub, it must be cleared and grubbed, and then dug over and all stones and roots removed. The land need not necessarily be scrub; many forest soils will make good nurseries.

The area necessary must be worked out by the grower for himself. For instance, a bed 3 feet wide with a path 18 inches wide alongside, and the plants 6 inches apart, would mean that a bed 20 feet long would carry about 240 plants; and for a nursery of 10,000 plants or thereabouts, an area of 60 feet by 60 feet or about 400 square yards would be necessary, and so on according to the distance apart of the seedlings and the number required.

In laying out the nursery a uniform width of 3 feet for the beds will be found the best, with a space of at least 1 foot 6 inches between each as combined footpath and drain. The shape of the nursery does not matter, and must fall in with the extent of the available land. If there is opportunity of choice, make the nursery as square as may be.

The remark respecting raised or sunk beds in the last article applies to the nursery as well as to the germinating bed. The nursery must now be shaded. This may be done by laying grass or leaves on a light framework of sticks 2 to 2½ feet high over each bed. Another method is to sew rings on to Hessian and run this over each bed on wires, but this is expensive, and causes a deal of unnecessary work in moving, erecting, and removing. An ingenious method of shading I observed in the Mackay district was to plait blade grass into wire netting. The netting is just the width of the bed, and this covering can be fairly easily lifted for watering or weeding, and rolled up for removal without fear of disarrangement. The objections to low shade of any kind, however, are that the edges of the beds and frequently the two side rows of plants get dry and sunburnt, and when the plants get older, the shade being so near to them, they suffer from want of light, air, and ventilation.

Exactly the same amount of shade 6 feet higher up makes a deal of difference in allowing free ventilation, both by day and night, and more light. Hence the generally accepted method of shading nurseries now is by leafy branches, &c., on a framework of saplings some 6 feet above the beds and covering the whole nursery—*i.e.*, paths, drain, and all. To erect these, forked posts 7 to 8 feet long are planted 18 inches to 2 feet deep in the earth at the edges of the beds—*i.e.*, neither in the beds nor in the paths. Ordinary scrub posts are cheapest, and if green posts of such wood as fig, that will grow itself, is used the shading for the nursery will be found to last out two seasons and perhaps more. Any excessive tendency to sprout on the part of the posts is easily checked.

These forked posts should not be further than 9 feet apart each way; on these thin saplings may be laid in the fork, and more across again. Any available substance, such as grass, straw, green leafy branches, or cane-tops, will do to cover them, but it is not necessary to *thatch* the top—for we desire only shade, and not to keep out rain or all the sunlight. Grass or cane-tops last best, but will need removing again later on, and large leaves such as banana collect rain-water and pour it out on one spot in the bed below, washing away plants and damaging the bed. Branches or small-leaved trees or bushes make the safest shade, and the leaves generally will gradually fall off and naturally lighten the shade as time goes on, which is an advantage, since to obtain hardy and strong seedlings the shade has to be gradually reduced from the third month until within two or three weeks of planting out, when the bare framework will give quite sufficient shade. The special advantages of high shade are that while costing very little more than low shade, if any, it allows of easy access and of working under and watering, allows free play for air and ventilation, and produces straighter and better plants.

If the germinating beds have been made on the site of the nursery itself, the high nursery roof should be built over the low shade already on the germinating bed, and the latter removed as soon as the other is completed. The young seedlings must then be carefully watched until the seed leaves open, and at once removed to the large nursery beds. The seedlings will not all open at once, and care must be taken not to take out half-open seedlings or those where the follicles have not yet burst the putamen or parchment-like covering, for these will take a very long time to do so, once transplanted, and possibly will not open at all. Pull up each seedling with the finger and thumb. Be careful to pull straight up, or the taproot will break; if pulled straight the taproot will come up long and fibrous, and must then be nipped back to a length of about 3 inches.

It is a good plan, in planting up a nursery from a germinating bed, to prepare carefully (by digging or forking up to a depth of at least 1 foot and removing all roots and stones and even hard lumps of earth) one bed or so a day, and pulling up first thing in the morning all seedlings that have opened their leaves during the night, and plant them out at once.

The bed should be watered an hour or two before the plants are put in, and directly or very soon afterwards; but not immediately before planting, or the top will become too wet and muddy.

Pricking Out.—The seedlings just pulled out of the germinating bed should not be handled more than necessary. A large green leaf makes a cool receptacle for them, and in this they may be carried to the beds. One or two small sticks must be cut about twice the thickness of a pencil, 1 foot or so long and pointed at one end, with which to prick holes. A board with the distances cut on it is better than string or rope for marking. The hole should be made 4 or 5 inches deep, and if the stick is twisted on being pulled out the hole will not immediately fill in again even if the soil is somewhat dry. The seedlings then (having had the taproots nipped back when necessary), should be put in deep and pulled up again slightly. This is to ensure the taproot being quite straight. Then when the seedling, still held between the finger and thumb, is about the same level as it was in the germinating bed, the stick should again be inserted alongside the original hole and as deep, and the earth gently but firmly levered against the root of the seedling. Beware of pricking out in such a manner that, though the plant seems firm, the earth is not pressed against the root all the way down—for if so the seedling will droop and die within the day. In picking out seedlings from the germinating bed examine the roots of each and discard twisted or bent roots at once, drooping or sickly seedlings, and those that are imperfectly formed or have a hard, thin, whitish stalk instead of a comparatively thick and green stalk. These had better be thrown away before any more time or money is wasted over them. In short, select the fittest.

Distance Apart.—Not less than 4 inches and up to 6 inches is a good distance. If closer, the plants begin to grow weedy and whippy by the time they are 6 inches high. If any are intended to stand over as stumps for next year, plant at least 6 inches apart and further if space will allow. Four inches is sufficient for plants that will be put out in the field when 8 to 10 inches high, to which size they will grow from four to six months after pricking out into the beds.

Manuring.—This should be quite unnecessary in a new nursery. If in an old nursery, a little well-rotted farmyard manure, ashes, and sand or burnt earth, in equal proportions, may be mixed in the soil on the beds *before* pricking out; and if the plants do not come on well after two or three months in the beds, a little weak liquid manure, such as fresh cowdung mixed in water until it can be readily poured through the rose of a watering-can, may be used, but the bed must be pricked over lightly soon afterwards to get the full benefit of this. Beware of artificial manures, and liquid manures too strong in ammonia. Artificial or commercial fertilisers had better be avoided in the nursery. They are dangerous unless very carefully and lightly applied, and should in any case not be used once the seedlings are pricked out. A purely nitrogenous manure might be used, but potash or phosphoric acid are both unnecessary in this stage of the plant. I would, however, deprecate the use of any manure yet—time enough when the trees are older and need a stimulant.

Watering must be carefully attended to, and the beds also kept free from weeds. No mulch, whether cut or whole, is necessary or advisable. The beds should be sufficiently shaded without. Watering once a day will be necessary (unless the weather is cloudy or wet, of course) at first, but this can be gradually reduced to once a week, as the plants get their third and fourth pairs of leaves. Even under the nursery shade it is better, when possible, to get the watering done either before sunrise or after sunset.

The plants will not need much attention after this. An occasional light weeding, which must be done by hand, will be found necessary; but if the ground is well and carefully prepared, not many weeds will show for the first month or more, and, after the plants cover the ground, very few will grow. The shade must be regulated, however, and gradually decreased as mentioned before. The branches used will by this time have begun to shed their leaves, and if they do not drop fast enough a shake now and again will be found sufficient. I have seen ti-tree branches used with good results.

Natural shade cannot be made use of for nurseries. However high and light it may be, seedlings will not come on well if the nursery be made under a

standing tree. The shade will be too permanent, and the plants will suffer from drip to an incredible extent. The beds become hard as a metalled roadway, and frequently moss-covered and sour. The seedlings will be found growing on little pinnacles of earth, and will become bark-bound and enfeebled before they are 4 inches high.

Wild seedlings and seedlings from old coffee-trees also suffer from drip, and are frequently ruined as plants in this way. "Wild" is the term applied to self-sown plants in land not under cultivation from seed dropped by birds or vermin. The parent tree may be either cultivated or itself wild. This has not occurred to any great extent yet in Queensland, but seedlings from under old coffee-trees I have frequently seen used with very doubtful success, such plants naturally having deteriorated. If a grower wishes to make use of these for any reason, I would offer a word of warning. Perfectly good plants may be made out of these, but special care is necessary. It must be borne in mind that no selection of seed has been exercised, and, moreover, the seed has fallen in stony ground compared with those in the germinating bed. If taken young enough there is some chance of making fairly healthy plants of them, but avoid the young plant that, having three or four pairs of leaves, is about the thickness of No. 16 wire and about as hard. They will seldom come to anything, and if taken up as young plants, either from the scrub (wild) or from under old trees, will be a source of disappointment. Seventy-five per cent. of these will die out in the wild state before they are 1 foot high. If left till later—a year old or so—and then taken, there is better chance of success with them as stumped plants, for by then Nature has carried out her own selection.

In taking up these it is best to put them in a nursery bed after stumping, some month or so before the planting-out season, by which time they will have grown healthy young suckers, one or two of which may be left on when put in the field. This method is only used in case of dearth of plants; otherwise any apparent saving in trouble and cost of raising is lost by the inability to tell whether you are getting a good, bad, or indifferent class of tree and bearer until it comes into bearing some three years afterwards. Accepting this risk, if taken quite young and treated the same as other seedlings in the nursery, they will make good plants. These used to be used extensively in the old days for planting up new clearings, but modern culture has discarded them in favour of plants from selected seed, and very rightly, too, for coffee culture is not nowadays the simple, easy way of making money it used to be 30 years ago, and the grower must endeavour to propagate his good and heavy bearing varieties, and be always on the alert against deterioration of species.

Stumps.—Among growers the terms "stumps" and "stump-plants" are often confounded. Stumped or stump-plants are obtained by leaving in the nursery the excess seedlings one year and cutting them back to within about 6 inches of the ground, a month or so before being removed, in the same way as first-year seedlings (to be described in a later chapter), and being planted out the second year. Such plants will have on them subsequent growths or suckers of from 4 to 6 inches in length, one or two of which are left growing on the cut stump when planted out in the field. (*See* Fig. *C.*) "Stumps" pure and simple are either plants that have in the same way been left over from last year in the nursery, or that have been found growing under old trees or in land adjoining the old clearing, and are pulled up and "pencilled" or cut at the time of planting out in the field: the one starts in the field with a certain amount of leaf already growing, and the other with none. Stumped plants or plants that have, some time before planting, been cut back, have no advantage over new seedlings; this method of culture being used principally to use up valuable plants of good quality or variety in the nursery that otherwise would have to be thrown away, or to get a better and more sturdy growth on good stock that by accident, neglect, or various reasons, become weedy, seedy, and spindly. This cutting back or stumping is frequently resorted to in the field with excellent results, and this matter will, therefore, be dealt with again when writing on plants in the field. Stumps may be used to advantage when the weather is

uncertain, and when ordinary bed plants would probably droop considerably before they had time to strike well; when they have to be transported long distances since no earth need be carried with them; when nurseries are late or no nursery plants available. Plants from one to two years old make the best stumps; older than that, unless they can be left to grow where they stand, generally it will pay better not to attempt stumping, though a stunted three-year-old may make a good stump. It is always better to pencil plants once they have made primaries, however small. This does not necessarily mean that any planting out of old trees without stumping is doomed to failure. Old trees, even 10 or 15 years old, may be transplanted with perfect safety, and even a standing crop can be ripened on a tree after transplantation, if only sufficient care is exercised in the work. Much work of this nature can be carried out with safety when 50 or 100 or even several hundred plants are to be tended; but when thousands are to be planted out, the labour, cost of transport, time, and attention to each become important factors. In these articles it must be borne in mind that the estate worked to pay is what I have in mind, and not the experimental or pleasure garden.

In "pencilling" plants, if the ground is soft they may be pulled up by hand; if not, a fork or a spade is put in near them to loosen the soil sufficiently for the plant to be pulled out and the earth taken away. Then the top or head of the plant should be cut away. It is the proper thing to leave three to four eyes above ground, but as it is often difficult to see the eyes, and this would take time, the plant is cut off with some 6 inches or so of stem over the root. This, from frequent experience, being found to be sufficient, next the taproot is cut away at about the same length, or in older and thicker plants 9 inches, leaving the "pencil" or stump from 1 foot to 1 foot 3 inches in length, according to its age.

The lateral roots are then cut away to within 1 inch or so from the stem, and in this state the now "pencilled" plants will stand a considerable amount of knocking about, and after being planted out will send up shoots or suckers in four weeks and sometimes less. (*See* Fig. *B.*, Plate 2.) In an uncertain season, when hot spells alternate with heavy rain, they will frequently show more growth than bed plants, but they need a little more attention. In a good, continuously cloudy, light showery, planting season, however, they will not catch up to the bed plants that have had no check whatever in their growth.

Let me give a word of warning about stumps. In a good season it has been found that they are apt to outgrow their strength. A sucker on an old tree will bear heavier crops, and sooner than the original main head, but it is always at the expense of the tree. In the same way the growth on a stump will, as will a good bed plant, frequently show a bean or two of crop in the first year, and more in the second; and from this fact has arisen a fallacy that by getting a two-year-old stump a maiden crop can be obtained one year after planting. A small scattering of crop may appear on stump plants, but a full maiden crop will not be obtained any earlier from stumped than from nursery or new bed plants. Should a sprinkling of crop appear on such in the first year, it is not a matter for congratulation, but rather extra caution, or disaster will follow. A large percentage die back or die out, and very probably in any case turn yellow and sickly, and lose in the second year as much, if not more, advantage than was gained in the first. A subsequent chapter will deal with the treatment of young trees in the field, and recur to this matter.

Basket Plants.—A word about the most usual method now in vogue among modern growers. Small baskets made of loosely plaited split bamboo about 9 inches deep, and 3 to 4 inches wide, are obtainable or easily made where bamboo is plentiful. In South India they cost about 5s. per 1,000. These are filled with mould, and set 10 in a row across in long beds, and seeds are either set singly in them or, as is more often the case, young plants are pricked into them from the germinating bed. On being planted out there is no fear of earth breaking away, or of damage to plants, and the basket rots away in a month

Plate CLXXI.

COFFEE NURSERY READY FOR PLANTING.
(Germinating Bed in Right-hand Corner showing Shading.)

A
Young Plant cut out from Bed, with ball of earth, six months old.

B
Pencilled or Stump.

C
Stumped Plant, five weeks after Stumping in Nursery, ready for planting out.

or less in the field. This method is out of the question for Queensland, as bamboo is not plentiful enough, and I merely mention it as a method almost universally in vogue where possible.

Another method is to cut bamboo into lengths, and use each bit as a separate pot in much the same way as the baskets, the bamboo pots being split with a blow from a small scrub knife when put out in the field. Pots are also sometimes made in a rough mould of ordinary earth, kneaded with water. These are square, about 4 inches across, having a small hollow, 2 by 4 inches in the middle; these stand together in beds, and the roots of the seedlings grow into them. When planting out, the squares of earth come away fairly easily, but the earth is apt to become too hard in the process, or to conglomerate on being frequently watered.

Clay pots are sometimes made in a rough-and-ready way if clay is available; but with white labour they would cost too much to make large, and if small would not allow of root growths, and might damage the taproot.

Burnt clay pots or garden pots make coffee nurseries *par excellence*, as might naturally be supposed; but, although they may be used many times, the cost is far beyond the means of the ordinary working farmer or coffee-grower.

HINTS TO COFFEE-GROWERS.

Now that the wet season is setting in, weeding with hoes becomes not only difficult but inadvisable. Sickling must be resorted to, and care taken that the weeds are cut down as close to the ground as possible, and no chance allowed them of seeding. If they are allowed to seed, there will be endless trouble later on; and if allowed to grow up into the coffee-trees, on the other hand, the trees will suffer and look sickly and yellow after the rains are over. An eye must be kept to drains, and these cleaned out after a heavy fall, that they may take off the superfluous surface water with as little of the soil as possible. Beware of wash also. A walk round the plantation after a night of rain will be amply repaid. Where the soil has been washed from the roots of a coffee-tree, remedy it at once by putting a shovelful of soil over the washed roots. Two days of hot sun on such exposed roots will turn the tree yellow and sick, and possibly cause the young crop to blacken and fall off.

Description of Plates.

Plate 1.—Coffee nursery ready for planting. Germinating bed in right-hand corner. Showing shading.

Plate 2.—*A*. Young plant cut out from bed, ready for planting in field—"ball o earth"; six months old. *B*. "Pencilled" or "Stump." *C*. Stumped-plant, five weeks after stumping in nursery. Ready for planting out.

COFFEE AT CAIRNS.

Mr. R. D. Lewis, coffee planter and manufacturer, of Cairns, obtained a very satisfactory return for his coffee crop last season. His plantation of bearing trees covered 10 acres, and when the whole crop was harvested it totalled about 9 tons. Next season he expects a larger crop from these trees, and will also increase his returns from the first bearing of young trees on another 10 acres. With the present rates prevailing in Brisbane—7d. per lb. for parchment, and 9d. per lb. for cleaned coffee—such a return may be looked upon as very encouraging.

Forestry.

SOME TIMBER TREES OF QUEENSLAND.

By J. W. FAWCETT,
Member of the English Arboricultural Society.

THE NATIVE MYRTLE (*BACKHOUSIA MYRTIFOLIA*, H. et Harv.)

Botanical Description.—The Native Myrtle is a medium-sized tree growing to a height of from 20 to 40 feet or more, with a diameter of from 1 to 18 inches. The young shoots are covered with silky hairs.

Leaves.—The leaves are opposite, narrow ovate in form, 1 or 2 inches in length, and with a fragrant smell and myrtle-like appearance.

Flowers.—The flowers are white and fragrant, arranged either in small cymes or in leafy panicles, and appear in bloom from August to January.

Fruit.—The fruit is a capsule.

Vernacular and Scientific Names.—The Native Myrtle is also known as the Grey Myrtle and Australian Myrtle. The specific name, *myrtifolia*, was applied to it on account of its myrtle-like leaves, by the British botanists, Sir W. J. Hooker and W. H. Harvey.

Distribution.—The Native Myrtle is found along creeks and on the banks of rivers in the costal district of South Queensland. It is also found in New South Wales.

Uses.—The Native Myrtle yields a very hard, tough, close-grained, prettily marked timber, with brown or dark-grey heartwood and light-coloured sapwood. It is very soft to the touch, and easily wrought, and useful for mallets, axe, pick, and other tool handles.

THE RED BOTTLE-BRUSH (*CALLISTEMON LANCEOLATUS*, DC.)

Botanical Description.—The Red Bottle-Brush or Water Gum is a small tree growing to 20, 30, and even 40 feet in height, with a diameter of from 1 to 18 inches. Sometimes it is a tall shrub, at others it is only low and bushy. The young shoots are silky, or covered with loose hairs, and the inflorescence is usually pubescent.

Bark.—The bark is of a brownish colour and rather rough.

Leaves.—The leaves are scattered, lanceolate, and of variable width. They are usually acute, from 1 to 2 or 3 inches long, by from ¼-inch to 1 inch and more in width. They are rigid (*i.e*, not flexible), more or less distinctly penniveined or feather-veined, and usually silky.

Flowers.—The flowers are in spikes, from 2 to 4 inches in length, but not very dense, and nodding. They are of a pink or deep red-colour, and appear from September to as late as March and April, and are much sought after by bees.

Fruit.—The fruit is a capsule enclosed in and more or less adnate or united to the truncate (or abruptly terminated) fruiting calyx.

Vernacular and Botanical Names.—The Red Bottle-Brush derived its name from the colour of its flowers and the resemblance of its flowering spike to a bottle-brush. It is also called Water Gum and River Myrtle from its habit of growing in or near the beds of rivers and streams. The generic name *Callistemon*, is derived from two Greek words—*Kallistos*, signifying very

beautiful, and *stemon*, a stamen; and was given to it by the celebrated British botanist, Dr. Robert Brown, on account of the beautiful stamens of some of the species. The specific name, *lanceolatus*, is Latin, signifying lanceolate, and was given to this species by the Genevan botanist, De Candolle, on account of the narrow lance-like shape of the leaves.

Distribution.—The Red Bottle-Brush is found growing in or near the beds of rivers and running streams, flowing on both sides of the Dividing Range, on the east coast of Queensland, New South Wales, and Victoria.

Uses.—The timber of the Red Bottle-Brush is of a reddish colour, very hard, heavy, and strong, close-grained and very tough. It is liable to crack and warp. As the tree never attains a large size, the uses of its timber are limited. It is used for shipbuilding and wheelwright's work, and also in the manufacture of implements and tools—such as axe and chisel handles, and mallets. It is also used in making gauges, and small work where strength is required. It is also used for boat knees and braces. The shavings of this timber will bend like a ribbon.

The blossoms of the Red Bottle-Brush are among the prettiest flowers of the Australian bush, and they attract great attention on account of their rich and gorgeous scarlet hues; the more so since the whole of their surroundings is of a green and generally monotonous effect. It is commonly cultivated, and on the banks of creeks, &c., proves an excellent tree for planting. Under cultivation, however, the Red Bottle-Brush displays great variation in its habit, size, foliage, and inflorescence.

The Willow-Leaved Bottle-Brush (*Callistemon salignus*, DC.)

Botanical Description.—The Willow-Leaved Bottle-Brush is a small tree, growing to a height of from 30 to 50 feet, with a diameter of from 18 to 20 inches. The young shoots are generally silky, and the inflorescence is usually pubescent, but sometimes glabrous.

Bark.—The bark is of a papery texture.

Leaves.—The leaves are scattered, and lanceolate in shape, acute, and variable in breadth. They measure from 2 to 4 inches in length, by about ½-inch in breadth; are very rigid or stiff, and are penniveined or featherveined.

Flowers.—The flowers are very showy, in cylindrical spikes from 2 to 4 inches in length, but not very dense. The blossoms are of a pale yellowish, and appear from October to December.

Fruit.—The fruit is a capsule.

Vernacular and Botanical Names.—The Willow-Leaved Bottle-Brush is so called from its willow-like leaves. It is also known as the Yellow Bottle-Brush (so called from the colour of its flowers), Broad-leaved Tea-Tree and River Tea-Tree (from its resemblance to the Tea or Ti-trees—the former name on account of its leaves being somewhat broader than is usual in ti-tree leaves, and the latter from one of its favourite habitats), and the White Water Gum (on account of the light colour of its timber). The specific name, *salignus*, was given to the species by De Candolle, on account of its willow-like leaves.

Distribution.—It is found by creek sides, and in swampy open forest country in the coastal districts of Southern Queensland, and in New South Wales.

Uses.—The timber of the Willow-Leaved Bottle-Brush is of a lightish colour, hard and tough, and very close-grained. It is durable, even under ground, but requires care in drying, as it is very apt to split if carelessly seasoned. It is useful for any purpose where strength and durability are required, and lasts well as fencing posts and railway sleepers. It is also used for wood-engraving.

On account of its prettiness, and especially in the flowering period, it is worthy of cultivation. It grows well, and flowers even when a shrub.

KARRI *v.* TEAK.

Tests—tensile and crushing (says the *Practical Engineer*)—were recently made in Bombay to ascertain the relative strengths of karri wood and teak. They resulted in favour of karri. It was also found that the cost of beams of karri would be rather less than rolled steel beams, while teak would be rather more, and that a solid timber beam 12 inches by 16 inches would make a more fireproof floor than light rolled beams.

FORESTRY.

Mr. James D. Schuyler, at the Convention of the American Forestry Association, Los Angeles, speaking of the influence of forests, said:—

It is not well established that forests have any special influence in increasing the rainfall of a region, although the presumption is that they have a slight tendency in that direction. But it is conceded that they have a very decided influence upon the temperature. In southern California, we particularly need all such influences to counteract the effect of desert winds upon our orchards, and lessen evaporation upon our reservoirs. The loss by evaporation in reservoirs, ranging as it does from 10 per cent. to 50 per cent. of their capacity annually, according to their relative depth and surface area exposed, is one of the most important factors in estimating the duty of stored water. No other losses can compare with it, and anything which will lessen it will extend their usefulness. A general extension of the forests of the arid region must have marked effect in cooling the surrounding atmosphere, reducing the velocity and temperature of winds, increasing humidity, and lessening evaporation.

Reforesting.—One of the encouraging features of the situation on the Pacific slope is the rapidity with which all forest trees, except the redwood, are being reproduced wherever they are protected from fires and from the ravages of sheep. Young pines, firs, and cedars spring up spontaneously where there is soil and moisture, and grow with vigour if let alone. This is a marked contrast to the sand plains of Wisconsin, Michigan, and other eastern States, where the pine forests, once out, seldom reproduce themselves, but are replaced by brambles and worthless brush. With proper care, therefore, the Western forests can be made a constant source of revenue, continually replenished.

Government Reserves.—A popular misconception of the intent and object of the Government in segregating forest reserves at the headwaters of our streams is that they are to be forever left in a virgin state, and so lost to public utility. This opinion is widely held, and needs to be eradicted, for the reverse is really true. The forests are not and should not be regarded as too immaculate for use. It is well recognised as far better and safer to make them a source of lumber and firewood, utilising the older trees and encouraging new growth, than to allow them to go to maturity and decay untouched. The guardians of the forest preserves should be required to gather seeds of trees and plants and sow them wherever they can be induced to grow. They should keep the young groves of trees properly thinned out, and have authority to sell sawlogs and firewood wherever the trees can be judiciously spared.

Fertility in Irrigation Water.—One of the important, though little considered, uses of the forest to the irrigator is the conversion of organic vegetable mould into nitrogenous plant food. This is going on through the agency of the ever-present bacteria, which reconvert the organic waste of the world into innocuous and useful mineral matter. Water, filtering through the soil, is constantly bearing these mineral nitrates into the streams, and thence out upon the lands. Streams from treeless mountains lack these nitrogenous elements to a great degree, and the water has less fertility and is less valuable for irrigation.

Forest Destruction.—The effect of the destruction of forests in mountainous regions is eloquently described by the eminent French political economist, Blanqui, in a memoir read before the Academy of Moral and Political Science of France, in 1843. He says, in referring to the Alps of Southern France—

Signs of unparalleled destruction are visible in all the mountain zone, and the solitudes of those districts are assuming an indescribable character of sterility and desolation. The gradual destruction of the woods has, in a thousand localities, annihilated at once the springs and the fuel. The abuse of the right of pasturage and the felling of the woods have stripped the soil of all its grass and all its trees, and the scorching rays bake it to the consistency of porphyry. When moistened by the rain, as it has neither support nor cohesion, it rolls down to the valleys, sometimes in floods, resembling black, yellow, or reddish lava, sometimes in streams of pebbles, and even huge blocks of stone, which pour down with a frightful roar, and in their swift course exhibit the most convulsive movements. No tongue can give an adequate description of their devastations in one of those sudden floods, which resemble in almost none of their phenomena the action of ordinary river water. They are no longer overflowing brooks, but real seas, tumbling down in cataracts and rolling before them blocks of stone, which are hurled forward by the shock of waves like balls shot out by the explosion of gunpowder. A furious wind precedes the rushing water and announces its approach. Then comes a violent eruption, followed by a flow of muddy waves, and after a few hours all returns to the dreary silence which at periods of rest marks these abodes of desolation.

French Forestry.—After years of agitation and discussion, the work of restoring the woods and of controlling the floods and destructive erosion of the torrents was undertaken by the French Government at enormous cost, but with gratifying results, wherever carried out. The improvements consisted (1) of the systematic planting of trees, grass, and underbrush near the source of the streams, to prevent the sudden and rapid collection of rain and melted snow water. (2) The protection of the shores of the streams from undermining and their beds from erosion, by the erection of small dams of masonry, loose rock and brush, to diminish the grade and decrease the power of the water, to raise and widen the bed, and to retain and store detritus. Many of these structures were made of green branches that were induced to take root and grow. (3) The terracing of the mountain slopes in a way to retard the run off and guide the water into channels of light grade, where it could be conducted to the main streams without washing the soil. On one small watershed of less than 1,000 acres, the Government expended 125,000 dollars; but the benefits resulting immediately after completion were estimated at more than double that sum.

Other European Forestry Work.—The Austrian and Swiss Governments have done a great deal of this work to restore the mountain watersheds to their original condition before the forests were destroyed, and great numbers of masonry dams have been erected, to an extreme height in one case, in the gorge of Ferrina, Austrian Tyrol, of 115 feet. These are built exclusively for retaining *débris* and curbing the power of the torrents. The usual height of such structures, however, is about 25 feet, and they are placed as near to each other as the grade of the torrent necessitates. Their effect is incidentally to store water, as well as gravel, for the voids in gravel reservoirs of that kind retain a considerable volume of water, which is given off gradually to the stream. Such work can be done to advantage on every mountain stream in California, and I have no doubt that similar works will ultimately be undertaken in various parts of the arid West as a necessity, although it will require much agitation and united public opinion to secure appropriations from the general Government for such construction. The most important work in hand, however, is to take measures for preventing the further destruction of forest, and avoid the necessity for extensive correction of erosion in our mountain slopes and streams. This costs less than the subsequent correction, and is more easily accomplished.

When this is well in hand, when we have adopted practical measures for recovering our denuded mountain areas with plant growth and for protecting the forests we have left, a persistent effort should be directed toward the bridling of our torrents and the conversion of every mountain canyon into storage reservoirs. In this way only will our water supply be sensibly augmented and a large portion of the wealth of water annually wasting into the ocean or sinking in the deserts be retarded and retained for useful ends.

HOW TO TRANSPLANT YOUNG TREES.

Too much care cannot be exercised in taking up a young tree for the purpose of transplantation. If it be taken up roughly many of the young feeding roots will be destroyed, and without these the necessary amount of sap cannot be supplied to the branches and buds, yet the tree will continue to evaporate a large amount of water. The consequence of this evaporation and failure of supply is that the tree will often fail, or will remain for a long time a sickly, struggling object, unless assistance is given by removing sufficient branches and buds to compensate for the loss of roots. In any case, the damaged roots should be cut off clean with a sharp knife. In taking up the young tree, first remove all the surface soil down to the root system. Then dig a trench round it at some distance from the extremities of the roots. If the weather be dry, it is a good plan to water the roots copiously, to cause the soil to adhere. Then, with a sharp spade, cut under the roots and loosen the boll of earth from that below. The tree may then be safely removed, the tender roots having received very little damage; and if it be carefully replanted, success will be almost assured. In the latter process, the roots should be spread out evenly on a loose bed, and the soil pressed firmly upon all the fibres, thus excluding air as much as possible. The depth at which the young tree is planted will depend upon the nature of the soil in the new location. If the latter is of the same quality as that from which the tree was taken, then the depth should be the same; but if the soil is heavier than the former, then the plant should be set shallower in the ground; and on the other hand, if lighter, then it should be planted deeper. On finally filling in the hole, the surface soil should be fine and light, because moisture can then not escape by capillarity.

A good plan for transplanting palm-trees from the scrubs is to dig round the palm at a distance from the roots, and then to insert a box underneath the roots, one end of the box being first taken out. The removed soil is then replaced, and the tree is left till next season, when it can be safely removed by simply lifting the box in which it will have been growing.

THE FORESTS OF CENTRAL QUEENSLAND.

The *Capricornian* Christmas number thus describes the forest west of Rockhampton:—The country between Rockhampton and Emerald is in the main heavily timbered with ironbark, bloodwood, spotted gum, and other woods. Giant trees rearing their trunks out of a dense undergrowth of tulipwood, native beech, sandalwood, and numerous varieties of the smaller timbers, shut out any extended view of the landscape when crossing the Gogango Range. As we near Duaringa we enter open forest country, well grassed. The timber industry gives employment to a number of people round about Duaringa and the localities a few miles further west. The principal sawmill is at Wallaroo, 7 miles beyond Duaringa. A great portion of the timber required for Mount Morgan mine is obtained from this locality. During the years 1897-8 there were 4,659,912 feet of hardwood, valued at £24,173, and 917,790 feet of soft-wood, valued at £4,467, cut in the Central Division. Timber, however, is a product which has so far been only slightly worked. The fine forests which

abound east of the main range must, as the division makes further progress, become highly valuable. This is more obvious when it is considered that the vast areas of the far west have but little timber. With this in view, the time has arrived for legislation to deal with the control of our forests. Supervision is necessary to prevent the oftentimes reckless destruction of young trees. In all the other colonies a system of State forestry has been introduced, under which the felling of timber is regulated.* Care must be exercised in cutting down the larger trees so as to not unduly destroy the younger growths.

FORESTRY IN BURMA.

Throughout the Old and the New World the subject of the conservation, preservation, and reproduction of the forests has occupied, and is now more than ever occupying, the attention of various Governments; and we have endeavoured to keep our readers posted in what is going on in this direction in other parts of the world. It having been decided to take steps for the proper management of our Queensland forests, we shall probably, at no distant date, be enabled from time to time to give valuable and interesting information respecting them, derived from the official reports of the conservator or inspector; meanwhile it will always be advantageous to know what is being done in forest conservancy in other parts of the British dominions. Turning to British Burma, we find that the forests, especially those consisting mainly of teak, are under the charge of a conservator, Mr. F. B. Manson, successor of Lieutenant-Colonel C. T. Bingham, nine deputy conservators, and three extra conservators.

The principal feature of the forest administration of the past year was the undertaking of extensive valuation surveys in the Mu and Chindwin forests, in order to ascertain the amount and value of available timber. The rapid expansion of forest operations is likely to create new divisions in the near future.

At the beginning of the year, the area of reserved forests in Lower Burma was 7,250 square miles; in Upper Burma, 6,808 square miles, or a total area of 14,707 square miles. Large tracts of forest in Upper Burma still await examination, and it will be many years before the work of reservation can be regarded as complete. Parties of the Imperial Survey Department are at work on forest surveys in various parts of the country.

The valuation surveys are carried out by the regular staff of gazetted officers supplemented by five junior assistant conservators. Rewards are granted, under exceptional circumstances, to forest subordinates who display unusual ability, diligence, courage, or who undergo exceptional hardship and incur exceptional risk.

REPRODUCTION AND IMPROVEMENT OF FOREST GROWTH.

The total area of regular plantations in the eastern circle at the close of the year was 132 acres. In the western circle there are no regular plantations. In the Pegu circle we find that 1,080 acres were planted with pure teak. The total area planted in the Pegu and Tenasserim circles was 52,231 acres, and 514 acres of teak were planted in the eastern circle.

OUT-TURN OF THE FORESTS.

		Cubic feet.
Timber—	Lower Burma	10,929,282
	Upper Burma	21,028,155
Fuel—	Lower Burma	7,761,327
	Upper Burma	18,368,057
	Total timber and fuel ...	58,086,821

Minor forest products, such as grazing rights, bamboos, &c., produced a very large sum during the year; 130,214,667 bamboos alone producing 194,935 rupees.

* Provision has been made by the Government for the proper protection of the forests of Queensland.—Ed. Q.A.J.

EXTRACTION OF TIMBER.

The Government, during 1897-98, worked out about 50,000 tons of teak; whilst lessees extracted 257,517 tons, valued at 28,12,660 rupees. The cost of extraction by the Government was 12,13,2 rupees per ton. In addition to this, 14,882 logs containing 8,953 tons of rejected teak—*i.e*, logs of inferior quality—yielded a net revenue, on being made over to contractors on payment of local duty rates, or sold on the half-profit principle, of 85,412 rupees.

REVENUE AND EXPENDITURE.

Receipts during the forest year	72,09,903 rupees
Expenditure	21,78,878 „

showing a surplus of 50,31,025 rupees, which exceeded by more than eight lakhs* the net revenue of any previous year.

The proportion of surplus to gross revenue was 69·78 per cent. For the financial year the proportion was 70·44 per cent.

Summarising the results in the Tenasserim circle, Mr. F. B. Manson Conservator of Forests, gives the following particulars:—The area of reserved forests at the close of 1898 was 4,137 square miles, and the area of new teak plantations was 1,464 acres. During the year 15,417 logs or 10,436 tons of teak and 939 logs or 478 tons of other woods were extracted and brought to depôt by Government agency; whilst under license 26,229 logs of teak and 56,077 tons of other woods were extracted. The gross yield of the Tenasserim circle was:—Teak, 37,436 tons; other woods, 57,061 tons; firewood and charcoal, 64,838 tons; bamboos, 4,168,512 in number; canes, 13,309,769 in number; and other minor products of a value of 9,842 rupees, exclusive of estimated grazing fees. The gross revenue of the circle was 19,78,727 rupees, and the gross expenditure 5,91,270 rupees, leaving a net revenue of 13,87,457 rupees, or nearly £81,500.

ARTIFICIAL REPRODUCTION.

Expenditure on plantations—

Formation of 1,464 acres	14,268 rupees
Maintenance of 7,675 acres	14,667 „
	28,935 „

The exports of teak from Moulmein and Rangoon during the year 1897-1898 reached 273,391 tons, of a value of 23,858,973 rupees, or an average of 87·27 rupees per ton.

A vernacular school of forestry is to be established at Tharrawaddy.

AFFORESTING THE DESERT.

Tree and shrub planting along the Suez Canal is in progress to protect the canal from drifting sand, according to the July bulletin of the *Société Internationale d'Agriculture*. Previous trials with fascines, sand fences, &c., have failed, and in 1896 the canal company began the planting of living plants. Reeds have been planted along 87 miles of the water line of the canal proper, and along the whole length of the Sweetwater Canal; these reeds are at first protected by fascines against the violence of the bank eddies caused by passing ships. On the slopes and top of the banks of the Sweetwater Canal plantations of shrubbery have been set out; the *Alfa* and *Atriplex halimus* being

* The lakh is 100,000 rupees, and the present value of the rupee is about 1s. 2d. On this basis the surplus of 50 lakhs would represent £291,666 13s. 4d.—Ed. *Q.A.J.*

chiefly used. Upon part of the ship canal and along 19 miles of the Sweetwater Canal plantations of trees have been set out, extending back about 328 feet from the water line; these trees are intended as a screen to check the advance of sand from the desert; among the trees planted are the *Eucalyptus* and cypress. A system of irrigation by fresh water has been organised for these plantations, the water coming from the Nile by the canals excavated when the ship canal was being built. So far the results are encouraging.—*Engineering News.*

Statistics.

QUEENSLAND EXPORTS.

Return showing the quantity and value of station and farm produce exported from the port of Brisbane during the year ended 31st December, 1899:—

—	Quantity.	Value.
	lb.	£
Butter	1,145,664	49,017
Cheese	9,179	194
Bacon	777,630	21,728
Hams	239,609	8,974
Sugar	..	1,153,072
Wool	...	3,402,274
Hides and Skins	....	698,627
Meat, preserved and frozen	...	1,445,145
Tallow	..	468,829
Green Fruit	...	93,077

QUEENSLAND PRODUCTS IN BRITISH MARKETS.

LATEST AVERAGE WHOLESALE PRICES.

Butter.—Choicest, 102s.; finest, 98s.; choicest New Zealand, 100s. to 106s.; choicest Danish, 112s. per cwt.

Cheese.—American, 58s. per cwt.

Sugar.—£15 10s. to £16 10s. per ton; German beet, 88 per cent., 9s. 4½d. per cwt.

Molasses.—5s. to 6s. per cwt. No Queensland molasses in stock.

Rice.—Patna, 13s. to 22s.; Java, 13s. 6d. to 26s. per cwt.

Coffee.—Finest Coorg peaberry, 92s. to 120s. per cwt.; Ceylon plantation, 92s. to 116s. per cwt.; bold blue, 58s. to 80s.; Santos, 38s. to 50s.

Arrowroot.—4¾d. to 1s. 10d. per lb.; Bermuda, 2s. per lb.

Wheat.—26s. to 30s. per quarter; 3s. 3d. to 3s. 9d. per bushel.

Ginger.—Calicut, rough, 28s. per cwt. Jamaica: Finest, 110s. to 140s.; fair, 58s. to 65s.; fine, 99s. to 100s. per cwt.

TOBACCO.—London prices for pipe tobacco, on 1st December, 1899—Kentucky Leaf: Common to fair, 2½d. to 5½d.; coloury, good to fine, 7½d. to 9½d. Virginia Leaf: Common to fair, 2½d. to 6d.; coloury, good to fine, 4½d. to 1s. 1d. Kentucky Strips: Common to fair, 3½d. to 7½d; good to fine, 8d. to 11d. Virginia Strips: Common to fair, 4d. to 8d.; good, fine, and coloury, 8d. to 1s. 3d. London prices for cigar tobaccos—Sumatra, 7d. to 5s.; Manilla, 4d. to 4s.; Havana, 8d. to 5s.

WINE.—Fair red wine (Australian claret type) in bond, 2s. to 2s. 6d. per gallon; fine old quality, 4s. 6d. per gallon; Bassett's chablis, 12s. to 15s. per dozen quarts (probably duty paid); Kircher's port, £10 per pipe of 108 gallons, equal to about 2s. per gallon; ordinary London port, £10 per pipe of 110 gallons; Marsala, £12 per pipe of 96 gallons.

GREEN FRUIT.—Apples, 10s. to 18s. per case; pineapples, 2s. 6d. to 6s. each; oranges, 8s. to 16s. per box; grapes (selected), 20s. to 24s.

EGGS.—Irish, 15s. per 120; Danish, 13s. 6d. to 16s. per 120.

HONEY.—28s. per cwt.

OLIVE OIL.—£32 10s. to £35 per tun (252 gallons).

WOOL.—At the sixth series for 1899 of London sales of colonial wool there was a very large attendance of both home and foreign buyers, and keen competition. Prices, as compared with the closing rates of last series, showed for Australian merino wool an average rise of 15, for crossbred of 15 to 20 per cent. Cape grease ruled 10 to 15 per cent., scoured 5 to 10 per cent. higher. Deducting what has been forwarded direct, but adding the wools held over from last series, the total available amounts to 107,000 bales. The Australian wools include about 50,000 bales of the new clip. First series for 1900 opened with a slight decline on 16th January. Buyers operated hesitatingly, and prices realised were from par to a decline of 5 per cent. compared with the closing rates of the last series.

FROZEN MEAT.—The latest quotations to 13th January for the various descriptions of frozen meat are:—New Zealand mutton (crossbred wethers and maiden ewes): Canterbury, 3 1/16d.; Dunedin and Southland, 2 13/16d.; North Island, 2 13/16d. Australian mutton (crossbred and merino wethers): Heavy (over 50 lb.), 2⅝d.; light (under 50 lb.), 2⅝d.; River Plate mutton (crossbred and merino wethers): Heavy, 2 1/16d.; light, 2 1/16d. New Zealand lambs: Prime Canterbury (32 lb. to 42 lb.), 4½d.; fair average, 4d. Australian lambs: Prime, 4d; fair average, 3½d. Australian frozen meat: Prime ox, forequarters, 3¼d.; prime ox, hindquarters, 3¼d.; secondary, forequarters, 3d.; secondary, hindquarters, 3⅛d. The above prices are the official quotations furnished by the Frozen Meat Trade Association. The basis of quotations is sales of lines of not less than 100 carcasses of mutton or lamb or 25 quarters of beef. All the quotations for mutton are for average quality. Quotations for New Zealand and Australian lambs do not include sales of small lambs or heavies or inferior quality.

BACON.—44s. to 47s. to 50s. per cwt.

HAMS.—56s. to 60s. per cwt.

HIDES.—Bullock, 4⅞d. to 7¾d. per lb.; horse, 7s. 3d. to 9s. each.

SKINS.—Sheep, from 7d. to 10½d. per lb.; lamb, from 1s. to 5s. each.

TALLOW.—The price realised on 2nd December for mutton tallow, fine, was 27s. to 28s. 6d. per cwt.; mutton, medium, 23s.; beef, fine, 27s.; beef, medium, 25s. to 25s. 6d.

HORNS.—Extra large, 52s. to 60s.; large, 40s. to 47s. 6d.; medium, 25s. to 35s.; small, 12s. 6d. to 20s. per 100.

BONES.—Shanks, round, £5 to £5 10s.; flat, £3 10s. to £3 15s.; mixed, £3 5s. to £3 15s. per ton.

Entomology.

CATERPILLAR PLAGUE.

(Leucania unipuncta, Haw.)

By HENRY TRYON,
Entomologist.

(Plates CLXXII.–IV.)

INTRODUCTORY.

At two periods of the year—September-October and March-May—reference may be found in the Press to serious ravages committed on pasturage and cereal crops by caterpillars. These caterpillars are the young of two night-flying moths, known, respectively, as *Leucania unipuncta*, Haw. (*extranea*, Gn.) and *Spodoptera mauritia*, Boisd. Of these, the former is the insect that is generally concerned, and is the one to which subsequent remarks will be confined.

This insect is one whose range of occurrence is very extended, being met with, according to E. Meyrick, not only in Australia and New Zealand, but also in Europe, Southern Asia, and North America. In the last-mentioned region it bears the significant name of "army worm."

As a caterpillar, a chrysalis, or a moth, it is to be observed in districts that it affects throughout the year in varying degrees of prevalence. It has many enemies. Not only do birds devour it, but it is the prey also of many carnivorous insects. It is, however, most effectually held in check by internal parasites and disease—both fungus and bacterial; and, moreover, special meteorological conditions determine the death of its eggs. Under ordinary circumstances these factors prove competent to hold it entirely in subjection; and it is only when, under conditions that are not fully understood, their operation is temporarily suspended, that a caterpillar plague manifests itself. The occurrence of the insect in formidable numbers is also the occasion for its enemies to assert their fullest influence. Hence it usually happens that a district is rarely visited in successive seasons by this pest, and, indeed, years may sometimes elapse between one visitation and another.

NATURE OF INJURY.

The caterpillars consume the foliage and stems of various species of native grasses, also those of introduced kinds—such as Panicum and Prairie (*Bromus unioloides*)—grown for hay or other purposes. They also devour oats, rye, barley, wheat, maize, sorghum, and possibly young sugar-cane; and will sustain themselves by nibbling, and so damaging, the shoots of lucerne, and even those of the potato. In the case of wheat not only is the flag consumed but the spikelets of the head may be eaten right back to the rachis, as is represented on Plate CLXXII. Rye in ear they will simply strip of every leaf, the bare stalks and heads alone remaining. Should the cereal not have already flowered, it may be eaten down to the ground: a remark that especially applies to young maize, no vestige of which may remain after caterpillars have passed over a field devoted to this crop. When young wheat has already been cut and tied up, the caterpillars may even eat the top of the shooks back for several inches. And when exceptionally the growth is sufficiently advanced at the time of their visitation, for the crop, after cutting, to be dried for hay without risk of heating, it may be found that it has already become so soiled by the dead bodies of the marauders as to be wholly rejected by the animals to which it is presented, either in the form of chaff or otherwise. Their destructive action, moreover, is not only thorough but it is also extensive. In the district of Ma Ma Creek,

quite 200 acres were seriously damaged or destroyed by this pest during September, 1899; and on the Darling Downs caterpillars rendered single plots of barley and wheat, 100 acres in extent, not even available for straw.

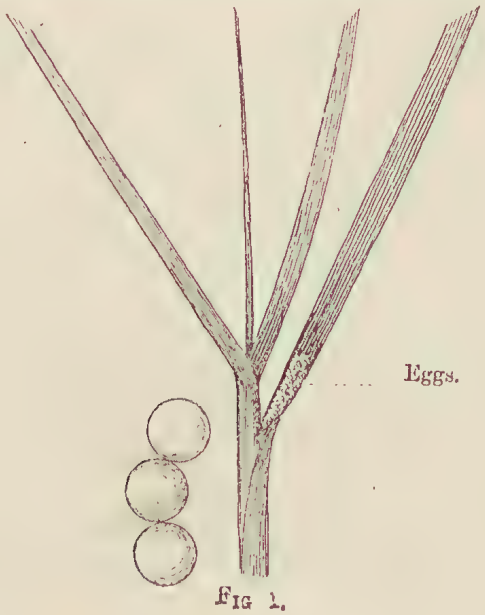
THE INSECT.

The special depredator referred to as *Leucania unipuncta* occurs under four different phases or conditions, viz.:—The Moth, the Egg, the Caterpillar, and the Chrysalis.

THE MOTH (*vide* Plate CLXXIII., Figs. 1 and 2).—Generally speaking, the moth is clay or fawn-coloured, with the forewings—of this colour—very thickly speckled with black, and having a minute white spot in their centres, and the hindwings, that are paler outwardly, blackish-brown. It may measure nearly 2 inches across the wings. The following more detailed description is taken from one of the writer's previous memoirs:—

"*Male.*—Fawn-coloured. When undisturbed the wings are directed backwards behind the body, so as to make an angle one with the other. Their surfaces are inclined, and their outer borders when in this position leave an angle between them. The eyes are brown, large (and hairy). There is a frontal tuft of brown black-tipped scales between the latter; the antennæ are minutely ciliated (in the males). The body is stout and tapers towards the tail, that is terminally tufted. The thorax is clothed with fawn-coloured hairs, and has a faint yellow dark-edged transverse stripe on the forepart between the anterior wings, and two oblique rows of black points on the hinder portion, meeting at an angle on the middle line. The abdomen is lighter brown, and without crests. The forewings are elongated, their anterior margin is straight, and their external slightly oblique. Each has a dark discal spot, containing a white point, anterior to which is a light-chestnut suffusion; a short oblique subapical brown streak; a line on the outer margin, and an exterior transverse one, of black points; internal to the latter line and between it and the discal spot is an interrupted waved brown stripe, often scarcely discernible. Hindwing short, broad with apex rounded, and external margin undulated; grey, passing into dark cinereous towards outer border (very distinct beneath); anterior border, yellowish-white; cilia, light-yellowish white. Beneath lighter coloured than above; a longitudinal line containing a few distinct black spots on each side of the abdomen; front border and outer portion of forewings, and fore border of hindwings, with light-black speckled scales; a cloud of dark cinereous colour across the outer third of forewing. Legs light-grey with black specks; fore tibiæ with two and hind tibiæ with four spurs. Extreme length when undisturbed, $\frac{4}{5}$ inch; expanse of wings, $1\frac{3}{5}$ inch; length of body, $\frac{3}{10}$ inch."—*Insect and Fungus Pests*, page 224: Brisbane, 1889.

EGG.—The eggs are spherical, somewhat flattened above, and measure about $\frac{1}{50}$ inch in diameter. Their surface is symmetrically rugose, but this feature is generally obscured by certain sticky matter with which they are covered at the time of their being laid. They are yellowish-white in colour, but darken with age. (The accompanying figure (1) displays eggs, of nearly natural size, *in situ* on the plant, and their appearance when magnified.)



Eggs.

FIG 1.

The Caterpillar (Plate CLXXIII., Fig. 1).—The caterpillars attain a length of 1½ inches and are nearly ¼-inch in diameter. They vary in colour with age. Thus, when newly hatched, they are translucent and almost white; then they acquire a greenish tinge, and later they become darker and have stripes that extend along the sides of their bodies. Still later, when about to become chrysalises, they are lighter coloured again, and meanwhile the stripes have changed to a paler hue. There are also dark and light varieties of the same age. The following detailed description will serve to more definitely define the characteristic features of the insect:—

A smooth-surfaced caterpillar, with a cylindrical body gradually narrowed towards the head, more suddenly towards the tail; the twelfth segment without transverse keel above. The mandibles brown bordered with black; the labrum is sinuated anteriorly and whitish; the anterior clypeus is longitudinally wrinkled; the posterior clypeus has a few transverse fine striæ, and is white with a central longitudinal brown mark, or is brown with a white border; top and sides of the head netted white and brown; prothoracic plate (shield behind the head), dark-brown, remainder of body greyish-brown (under the lens appearing mottled-brown on a white ground); thoracic legs, whitish with brown claws; abdominal prolegs, white, each with a transverse broad smoke-coloured band on its outer surface; spiracles, black (under-surface greenish, grey at the sides); two light-yellow broad stripes extend on each side of the back from the fore-border of the prothoracic plate, and are irregularly edged with black above; midway between them, along the centre of the back, is a third stripe of the same colour; this is usually interrupted and very indistinct. Below the dorso-lateral stripes are two bands on each side extending the whole length of the insect—one is along its inferior border contiguous to the spiracles, and the other is below their level. The latter is the more conspicuous, being cream-coloured with the central area mottled with light red. There are a few slightly raised hair-bearing black points on each segment. These number twelve on a segment in the mid-region of the body, the six on each side being disposed as follows:—One above the dorso-lateral line, one in it, one above the spiracle, one below it and on its side, and one at the base of the abdominal proleg. Length of caterpillar, 1½ inches."—*H. Tryon, op. cit.*, page 225.

The Chrysalis (Plate CLXXIII., Fig. 3).—This is of the form represented in the figure referred to. At first light-brown, it soon assumes a rich dark reddish-brown colour. It is smooth and shining, and when fully extended measures about ⅘ inch in length. The three anterior segments, that correspond to the hind body of the future moth, have each on the forepart a row of punctures between the breathing pores (spiracles), and the terminal segment ends in two nearly parallel sharp depressed spines.

HABITS OF INSECT.

The moth, under natural circumstances, is nocturnal in its habits, preferring the early part of the night for its movements. It will, however, take wing during any time of the day, even during the prevalence of bright sunshine, when disturbed. Amongst disturbing agents may be mentioned the wind, especially should the moth emerge from its chrysalis in an exposed spot. Under this circumstance, also, it follows its direction with rapid movement, after taking wing with great suddenness. Whilst engaged in flight it usually passes near the surface of the ground, except during the night, when it may wend its way at a height of some feet therefrom. In settling down it runs quickly to some hiding-place, especially selecting such as presents colouration in harmony with that of its own livery. It feeds upon the nectar of flowers. Some few days may elapse between the emergence of the moth from its chrysalis in the ground and the laying of its eggs. During this interval it conceals itself by day in any vegetable *débris*, sticks, grass, boards, &c., that may be met with in its immediate environment. But it goes forth night after night to feed, many kinds of flowers affording it sustenance. Each female moth—as has been ascertained by other observers—lays from 500 to 700 eggs. The site usually chosen for their reception is afforded by young leafy shoots of some rank growing grass, or of a cereal before any appearance of the flowering-stalk has arisen, especially when thickly sown and each plant resembles a small tussock. In selecting the spot for the reception of its eggs, the parent insect seems to anticipate the requirements of its young, which are protection from light and an abundance of succulent foliage. It, however, prefers that the plant should have arrived at a certain definite stage of growth, choosing such amongst others that, though adjacent, have evinced a less rapid

development. This was very noticeable in different stud wheats grown at the Hermitage State Farm in rows side by side and sown at the same time. In this instance such late varieties as Windsor Forest, New White Queen, Selected Square Head, Challenge White, and White Nursery were free from their attacks, whilst other more quickly maturing kinds growing near them were attacked, amongst which latter may be mentioned Allora Spring, Budd's Early, and Gayndah No. 4. The moth usually selects the leaf-sheath, or the spot where the flag comes away from the stem, as the site for its eggs. "When the female moth finds a stalk of grain or grass suited for her purpose, she clasps it with her legs, and thrusts her ovipositor into the unfolded base of the leaf or down into the sheath, where it surrounds the stalk" (*F. M. Webster*). Many eggs are laid together in one position at the same time (*vide* fig. 1, page 136). They are placed side by side in linear series of 20 or more, and enveloped in a sticky substance that causes them to remain adherent to the leaf surface on which they are placed and to one another. C. V. Riley states that exceptionally these are laid "in the cut straw of old stacks, or in hayricks, or even in pieces of cornstalk in the field, or in stubble." These eggs, under favourable circumstances, hatch in about a week or fifteen days. The minute caterpillars on hatching out feed at first on the shell of the egg whence they have arisen, then on their leafy surroundings at the base of the flags, after which they enter the innermost recesses of the plant (whence they may be shaken out), or even rest immediately beneath it. During this time they inflict no noticeable injury, so that their presence may not even be suspected. Both now and at a later period in their growth, the caterpillars feed almost wholly at night, especially during bright sunny weather. When, however, rain prevails and the weather is overcast, they may crawl to the most exposed portions of the plants whereon they occur, and feed also continuously (they will also similarly remain exposed when victimised by insect or parasites or by disease). When disturbed, they immediately drop from where they were previously feeding—the very young by a thread, the older without any. Having fallen, they quickly roll themselves up with the head inwards, and remain motionless, but after a minute or two they bestir themselves, and soon crawl away. Should the plant on which they feed be isolated or offer little concealment, they spend the day concealed in the nearest hiding-place they can find, as under a stone or piece of wood; also when crawling from place to place they will rest hidden beneath clods of earth or in such like places. When disturbed, especially in cloudy weather, they will frequently, whilst resting on their abdominal prolegs, elevate the forepart of their body, and move their head to and fro with sudden jerks. This also is their habit when attacked by insect parasites, and with the presence of these they probably instinctively associate every threatening danger. When developed to a third of their ultimate size or more, they may travel extensively from plant to plant during the hours of darkness. But when more fully grown they may supplement these nocturnal excursions by much more general ones pursued during the time daylight prevails. Referring to one of these excursions, Mr. G. Anderson, of Oakey Creek, informed the writer as follows:—"The caterpillars appeared to occur throughout 70 acres of barley simultaneously. They were in immense numbers. For three days they were upon the move between the hours of 12 and 3 on each occasion, the moving mass—for such was the appearance, due to their numbers—travelling west." The *Brisbane Courier* of 22nd March, 1898, referring to an occurrence of caterpillars in the Laidley district, stated also as follows:—"Some parts of the district are being ravaged by immense armies of caterpillars that march along and eat up grass, panicum, and even tackle the maize. Some farms in their track have been completely devastated." When in the course of these general movements they have occasion to cross land not occupied by the plants to which they are especially partial, they will nibble others, and so injure them to a greater or less extent. Thus all the shoots of lucerne were seen to be destroyed in one instance in the Ma Ma Creek district; in another case nearly all the young haulms of a

considerable acreage of potatoes had been gnawn down. As a rule it is not until the caterpillars are nearly full grown that attention is directed to their presence, which happens then by reason of the extent of their depredations ("the crop looking thin," as is often said) or the occurrence of such a moving host as has been alluded to.

The caterpillar takes from four to five weeks to mature, but this period is subject to variation in length, a circumstance connected with the amount of suitable food that is available for its consumption, as well as the occurrence or absence of congenial climatic conditions. Thus, during the winter, the insect will persist as a caterpillar for quite three months, during a portion of which time it remains in a semi-dormant condition.

When mature, it changes, as previously remarked, to a lighter colour, and its stripes grow paler. It then, under normal conditions, enters the ground to a depth of about 2 inches. Here, still outwardly a caterpillar, it becomes even paler in colour than before, and its body meanwhile becomes considerably shortened. In this position it may remain for two days (this period is also subject to variations in length), during which time, by special movements in different directions, it forms an oblong smooth chamber measuring about 1 inch in length, and meanwhile changes into a chrysalis such as has been described. In exceptional cases, however, it crawls beneath a stone, piece of fallen timber, sod of earth, or "land" in ploughed ground, and then transforms without constructing any chamber, though sometimes it covers itself with earth.

The insect having thus passed into a chrysalis remains in that condition usually for about two weeks; but again the time passed in this phase may vary from ten days to three or four weeks. At the expiration of this period the perfect insect or moth arises, a warm evening after rain being usually chosen for its appearance.

Although the caterpillars occurring even in the same field exhibit great variation in size and consequently in age, there are good grounds for concluding that, generally speaking, there are at least three broods, if not four, every year, although it is only during two periods of the year—September-October and March-April—that they occur of such exxtent as to prove noticeably destructive; their comparative smallness in the intervening periods being due to the operation of natural checks upon their growth and increase, as well as to the condition of growing crops. These three or four separate broods, however, overlap to a considerable degree. The caterpillars that were observed during 1899 in the Ma Ma Creek district from the second week in August onwards, and which had already transformed—in part—to moths by the third week of September, were no doubt derived from moths that had deposited their eggs, where these caterpillars were met with, in May. It was inferred that a similar state of things had obtained on the Darling Downs, since, in many instances, whereas wheat sown in April or May was subsequently attacked by caterpillars, that which had been planted in the same locality in June and July had escaped their visitation; a remark that also applied to both oats and barley. Where it had been otherwise, there was generally evidence forthcoming to point to a migration of caterpillars from the earlier to the later sown crop. The explanation of this is to be found in the fact that the crops, in order to evince the presence of caterpillars in September, require an access of the moths in May. If this is impracticable, they may escape their presence.

NATURAL ENEMIES.

It has already been stated in the introductory paragraph that under normal conditions the caterpillars of *Leucania unipuncta*, Haw., do not occur in such numbers as to inflict noticeable damage to pasturage, cereal, or hay crops. It is also true that when, under special circumstances, these pests have exceeded these limits in respect to numbers, forces come into operation to restore the balance of Nature by checking the enormous numerical development of these caterpillars that would follow the free exercise of their powers of increase.

This experience results from the operations of so-called natural enemies, in which category may be included not only predatory birds and other insects that find sustenance in preying upon their bodies, but parasitic forms of life to which the bodies of these caterpillars serve in the general capacity of host, providing at the same time not only aliment but dwelling-place also. As an instance of this, a plague of caterpillars caused some consternation by reason of its ravages in the district immediately to the south of Brisbane during March, 1895. The immediate descendants of these marauders still exist, a score of generations having succeeded one another since then; and yet we have learnt of no further trouble from caterpillars in the districts alluded to. But that this would be so was predicted by the writer at the time, after having remarked the extent to which parasitic insect had victimised these grubs concerned in the ravages complained of. And, in addition to the insect parasites, there are also certain fungi (Entomophthoreæ) and bacteria that produce general and fatal disease in the course, too, of their parasitic life in the tissues of these insects.

In the case of the visitations of caterpillars in September-October, 1899, that have suggested the preparation of this article, similar checks on increase were also operative, and no doubt in consequence similar beneficial results to those above alluded to will follow in most of the localities that have suffered. In the present instance parasitic insects were principally concerned, and amongst these the following are worthy of being especially mentioned:—

A. Insect Parasites.

Theronia rufipes, sp. nov. The Red Ichneumon. (Plate CLXXIV., Fig. 2).—This is a deep-red and glossy insect, having smoke-coloured wings that appear steel-blue in certain lights, and the anterior two-thirds of its hind body black and conspicuously spotted with a row of large white spots along each side. Very large female examples may be 11 lines in length, and have a wing spread of nearly 1½ inches, but as a rule in this sex their measurements are respectively 8 lines and 1 inch. These insects during overcast weather may be seen to alight on and explore in plants that are frequented by caterpillars; but it is during the prevalence of hot sunshine that they occur in greater numbers, though their extreme activity then often leads to their being overlooked. At this time, however, they may be remarked, passing rapidly to and fro just above the surface of the grass or cereal crop, ever and anon suddenly alighting and creeping amongst the herbage. Even at nightfall they are still at their posts, remaining three or four together stationary on the grass stems. On discovering a caterpillar they soon settle upon it after exploring it from all sides with their feelers, and notwithstanding the violent contortions into which it throws its head and body. Then they probe it deeply with their black needle-like ovipositor (composed of three separable parts and measuring ⅓-inch in length), and so place within its body one or more of their eggs. It is probable also that at the same time they either disperse in the air or inject into the tissues of their victim a fluid analogous to formic acid that they secrete, and that may serve the purpose either of an anæsthetic or preservative. One, at least, of the eggs of the ichneumon thus inserted hatches into a maggot that feeds within the caterpillar, and continues to develop as the growth of the latter is still continued; but at the same time it avoids touching organs the injury of which would result in speedy death.

Meanwhile, the caterpillar enters the ground, and, in the majority of instances, transforms to a chrysalis. Further transformation on its part is, however, restrained, for, instead of a moth emerging from the ground, there issues the red-bodied ichneumon fly, which digs its way to the surface through a small circular hole, that is sufficiently large to be readily perceived.

In the case of some chrysalises of grass-feeding caterpillars (*Spodoptera mauritia*) obtained during April, 1895, in the Tingalpa district, through the instrumentality of Mr. A. Grieve, it was remarked that, with the exception of an exceedingly small percentage, all gave birth to these parasites in lieu of moths.

It is, however, in attacking belated caterpillars that these ichneumons are most serviceable. When the *Theronias* emerge from the bodies of their hosts there are always a few caterpillars that have not as yet transformed to chrysalises. These, however, the female ichneumons search out with great pertinacity, and so ultimately destroy. Their presence in numbers on pasturages previously visited by caterpillars is often remarked by graziers, who are led to question the significance of this phenomenon. This happened in the case of the caterpillar plague at Rockville, Mombra, in 1896 (*T. Nicholson*). Mr. A. Grieve, in the instance above quoted, drew attention to the fact that the ichneumons that were hatching out under his observation were nearly all males—a fact that subsequently received corroboration from the experience of the writer. In this instance, moreover, it did not appear that it was a case of protandry, as has been noticed in the case of the related insect, *Pimpla inquisitor*, Say., by C. O. Howard in the United States. "With this species" he remarks ("Study on Insect Parasitism," page 13), "as with so many other parasitic Hymenoptera, and indeed as with so many other insects in general, there was a marked priority in the issue of the males." He then gives a tabulated statement showing that male *P. inquisitor* were appearing for seven successive days prior to the emergence of any female examples of the species.

As this insect does not appear to have been described and is of great economic interest, the following technical description is appended to ensure its correct identification :—

Theronia rufipes, sp. nov.—*Female :* Red, four anterior segments of hindbody, deep bluish black, each with a large ovate white spot on the side adjacent to the hind border, forming a lateral longitudinal series. Wings, fuliginous the fore ones having dark steel-blue reflections, especially towards the base ; antennæ outwardly, tarsus of hind legs and ovipositor fuscous. Altogether smooth and glossy. Hindbody impunctate. Head and thorax very faintly punctured. *Head* not lengthened, with straight fore-border ; antennæ situated in a broad shallow concavity, eyes excavated opposite the origin of these ; vertex narrow with rather sudden occipital slope. *Thorax*, mesonotum without wrinkles ; scutellum convex with two lateral keels enclosing a triangular space ; meta-thorax wrinkled transversely, and with a central ridge ending in an obtuse tubercle beyond which it is obliquely truncated, two dorso-lateral tuberosities on the margin of the hinder slope form a triangle with the preceding one, meta-thoracic spiracles oblong. *Wings*, pale fuscous, with the stigma and veins black, the latter becoming paler outwardly ; areola present, four-sided, the two transverse cubital nerves bounding its meeting on the radial. *Legs*, coxa of hind legs very large, their femora thickened with a tooth on the lower surface behind the middle, middle and hind tibiæ spurred, and with each two terminal spines, claws stout, simple. *Abdomen*, 1st segment oblique, truncated anteriorly ; 2nd, 3rd, 4th, and 5th segments with a lateral impression immediately above the spiracles extending backwards and outwards ; that of the 5th obsolete beyond the base ; immediately above this impression, and in front of the white lateral spot on the 2nd, 3rd, and 4th segments is a small tympanum-like spot (*lunula* of Foerster), round on the 2nd segment, oblong on the others ; hind border of segments 6 and 7 with deep-rounded excavation extending forwards half the length. *Ovipositor*, $\frac{1}{4}$th length of abdomen. Length (excl. ovipositor) 17 mm. ; wing-expansion, 28 mm. *Male :* Smaller, five abdominal segments white-spotted, 1st having two on each side (therefore lateral series 6 instead of 4 as in female). Vertex except sides, and occiput except orbital border of eyes ; sides of scutellum, and frenum black ; scutellum and frenum with raised yellow border.

Exephanes leucaniæ, sp. nov. (Ichneumonidæ.) (Plate CLXXIV., Fig. 3.)—This ichneumon is a dark-coloured insect, measuring about $\frac{1}{12}$th inch long, having a long band on the hind body ; the feelers and legs red ; also several white spots on the thorax present. With regard to it, it may be affirmed that observations point to the conclusion that it does not occur in such numbers as do the other hymenopterous parasites described, but still it was met with on the Darling Downs in such numbers as to indicate that considerable services in checking the increase of the caterpillar moth was being exerted by it. With reference to its movements, it may be stated that it is a far less active insect than is the more prevalent Red Theronia. Only male examples have been reared from victimised caterpillars ; but its systematic relations are sufficient evidence that its consort will prove to have a relatively short ovipositor. Probably not more than a single *Exephanes* grub reaches maturity within the body of its caterpillar host. No species of *Exephanes* existing in Australia appears to have been hitherto described. It may be thus characterised :—

Male. Exephanes leucaniæ, sp. nov. Black ; antennæ (except two basal joints), labial palps, legs (except coxæ and trochanters of all and special bands on hind legs), 2nd abdominal segment, and 3rd beneath, basal $\frac{2}{3}$ of costa and stigma of forewings horn-yellow to red ; front and clypeus (except

a triangular patch in the centre), anterior surface of basal joint of antennæ, prothorax above scutellum, a spot on each side of metathorax behind, two spots at root of forewing, a large spot on the inner aspect of the trochanter of each leg, a lateral spot at the extremity of the 1st joint of the abdomen, pale yellow; hind border of 3rd abdominal segment, wide band on hind border of 4th, and 5th on each side (bands not meeting above) and hind border of 6th, white. Antennæ fuscous towards extremities; tarsi (except proximal $\frac{2}{3}$rds of 1st joint), a broad band at extremity of both tibia and femur of hindlegs black. Entire surface thimble-punctured, frenum and metathorax above rugose; for the most part covered with fine whitish hair. Lower surface of abdomen glossy, otherwise dull. *Thorax* with scutellum evenly convex, separated from mesothorax by a wide smooth sulcus closed on each side by a sharp keel, that borders the mesothorax laterally; metathorax with rounded antero-posterior contour, with a sudden posterior declivity, and with four smooth longitudinal keels proceeding backwards from foreborder, the two lateral ones just above the slit-like spiracles becoming soon obsolete, the two dorsal ones united to the foregoing by transverse keels extending some way down hinder declivity; the latter also enclose a space that is divided into three areas by transverse keels, whereof the anterior one widens in front, and the middle one is square. *Abdomen*, petiole of 1st joint with a low narrow keel on each side beneath, and a dorsal one on each side above the spiracle; 2nd segment with large wrinkled depression on each side adjacent to the fore-border. *Wings* with areola well-marked, the transverse cubital veins, forming it, separated at origin on radial. Discoidal transverse, or 2nd recurrent, with a projection outwards in the middle of its length, a projection inwards also at origin of cubital vein; veins of forewing (except costa and stigma), blackish. Length, 15 mm.; expanse of wings, 23 mm.

3. *Paniscus* (*productus*, Brullé?). [Fam. Ophionoidæ.] (Plate CLXXIV., Fig. 4.) This is a large yellowish-brown clear-winged insect, having the hinder body, that is usually held in an arched position, compressed from side to side and widened towards its extremity. It measures nearly 1 inch in length, and has a wing expansion of $1\frac{1}{4}$ inches. Unlike the first-mentioned ichneumon, the sexes in this are much alike. However, the female has a short ovipositor that is not, however, always exserted. It also differs from it insomuch as the *Paniscus* grub is not an internal feeder, although when the caterpillar transforms into a chrysalis it becomes enclosed therein, though covered subsequently by its own special cocoon. It also has a comparatively slow flight, and does not dash hither and thither when on the wing, and in alighting it seems to do so with some hesitation. In attacking a caterpillar it fastens its dark-coloured eggs on the surface near the head. These eggs are pedunculated or stalked, and are attached by these stalks being inserted through and beneath the skin of the victim, this being in the first instance punctured by the parent ichneumon for the purpose. In feeding, the ichneumon grub does not wholly leave the egg-shell whence it has emanated, and ultimately this remains fixed to it at one end. Only a single ichneumon grub appears to mature in each chrysalis. These brown ichneumons were of very common occurrence amongst the *Leucania* caterpillars met with on the Darling Downs and elsewhere.

Brullé (Lepelletier de Saint Fargeau's "*Histoire naturelle des Insectes. Hymenoptères*, IV., p. 156) described, in 1846, an Australian species of *Paniscus*, but it does not appear that the present insect is identical with the one noticed by him. The following technical description will serve to distinguish the latter:—

Female.—Yellowish brown, spot on vertex including ocelli, scabbard of ovipositor and claws of feet black; posterior orbital band yellowish; legs passing outwardly to pale testaceous; finely punctured and for the most part clothed with appressed pale-coloured pubescence, a few stronger hairs on fore-border of clypeus. *Head*, depression containing antennary fossæ not divided. *Thorax*, scutellum with disc bounded by straight posteriorly approaching keels; metathorax transversely wrinkled, without distinct surface areas, fore-border roundly excavated, the excavation being bounded by a ridge. *Abdomen*, 1st joint with spiracles long before middle; ovipositor comparatively well developed, measuring when exserted nearly as long as first body segment; hairy divisions of scabbard curved upwards at origin. *Wings* with dark-brown veins and brownish-yellow stigma, areola present, 2nd recurrent (discoido-cubital transverse) continuous with outer cubital transverse, veins interrupted by—usually oval—clear glabrous spaces having the following disposition, one in the middle of 1st abscissa (present) of cubital, one in the outer cubital transverse, two in the 2nd recurrent (discoido-cubital), and one in the discoidal—between origin of subdiscoidal and posterior margin. *Claws* with comb-like teeth—as in other Ophionoidæ. Total length, 20 mm.; expanse wings, 17 mm.; hind legs, 20 mm.

Male.—Smaller, with abdomen more slender, and less wide at extremity. The face is either yellow, or much paler coloured than remainder of body; last abdominal segment represented by two oblong valves instead of a single sheathing scale.

4. *Apanteles ruficrus*, Haliday. [Braconidæ.] (Plate CLXXIV., Figs. 5, 5*a-b*.) This is a minute insect, measuring about $1\frac{1}{4}$ lines long, with a wing expansion of $2\frac{1}{2}$ lines. It is black in colour, with pale yellowish brown legs (the first joint of the hindmost pair being black), and four clear wings. It is best known from its cocoons, that are small, white, oblong bodies measuring each about $2\frac{1}{4}$ lines in length. They occur side by side, fastened together, by the loose silk that

surrounds each, in masses of 50 or 60 together, and are commonly met with attached to the stalks of grain where caterpillars occur. Those whose observations have brought them to light have, however, invariably regarded them as "caterpillar's eggs" meet for destruction. The female insect may, moreover, by close attention, be detected moving at the base of the herbage that is being devoured in quest of its prey, often running for this purpose over the ground. Having found a caterpillar, the *Apanteles* probes it with its ovipositor, and so inserts into its tissue its own tiny eggs by the score. The resulting larvæ feed upon the "juices" of their victim, and so gradually effect its destruction. This is accomplished, however, before the chrysalis stage is reached. The approach of death is heralded by a general torpidity and sluggishness in the movement of the caterpillar, which may, however, crawl aimlessly to exposed situations. But, meanwhile, the young of the parasite which infest it, after raising minute rounded swellings upon its surface opposite where they individually occur, pierce its skin, and immediately on issuing spin their cocoons; and when this has been accomplished, nothing but a shrivelled and darkened skin remains to represent their host.

The Queensland insect appears to be identical with *Apanteles ruficrus* of Haliday, as is seen on comparing it with the very full description of the latter given by Rev. T. A. Marshall [*vid.* Species des Hyménoptères D'Europe. Les Braconides, Vol I., page 410 (1888)]. This insect, according to the latter authority, occurs in Europe in parasitic relation with no less than seven distinct species of caterpillar, amongst which are included two species of *Leucania*—*i.e.*, the genus to which our present pest belongs.

This parasite is generally very efficacious in destroying the *Leucania* during the caterpillar phase of its existence. It is, however, itself in turn often preyed upon by a still smaller hymenopteron. This is a bronzy-black insect, measuring about 1 line in length, and is a chalcid-id fly apparently belonging to the genus *Dibrachys*. The *Dibrachys*, however, does not appear to attack it until it has accomplished, for a season, its useful work. It may, nevertheless, occur in such numbers as to render the *Apanteles* locally scarce for some considerable time. In the ordinary course of events, each little cocoon in the mass opens at the top by a little cap-like lid as if it had been cut across at this spot, and so the primary parasite emerges. But when the *Dibrachys* has attacked it, the end remains closed, and a small round opening eventually occurs in its wall.

5. *Linnæmyia nigripalpus*, n. s. [Fam. Tachinidæ.] (Plate CLXXIV., Fig. 6.) This insect, that resembles in general appearance a Meat Fly (*Sarcophaga*), or large house-fly, is very serviceable in preventing the transformations of the caterpillars to egg-laying moths. Where its victims occur, it may frequently be observed slowly wending its way amongst the wheat stalks and constantly settling thereon. It measures, as a rule, about $\frac{3}{16}$ inch in length, and is of a greyish colour, has an ashy white face, a dark-striped thorax, more or less pale brown upon the hind body, and brownish-yellow legs with black feet. It is, moreover, clothed with numerous stout black bristles and stiff hairs. Its habit is to glue one or more of its numerous eggs to the surface of the body of the caterpillar it attacks. These, on hatching, produce tiny maggots that bore their way into the tissue of their host, and feed thereon until fully developed; and then, without fabricating any special covering, they transform into pupæ within their own hardened, discoloured skins, becoming smooth, dark-brown or nearly black, cylindrical, objects with rounded ends.

The caterpillar has meanwhile entered the soil and become a chrysalis, though it would appear that sometimes the victim is not able to reach this degree of development. In the latter event the pupæ of the parasite are exposed in the soil instead of remaining within the protecting covering otherwise available.

The period that elapses between the attachment of the egg of the Tachinid parasite to the caterpillar and the appearance of the fly is about three weeks; but this is subject to variation as the result of special climatic and other conditions.

The percentage of caterpillars victimised by this fly, in any of the occurrences of this grass-marauder that have been observed in Queensland, has not been estimated. There are, however, grounds for concluding that in some instances it is very large.*

The following description will serve to identify this parasite :—

Linnamyia nigripalpus, sp. nov.—*Head* with frontal vitta wax-yellow coloured; face, cheeks greyish white; 2nd joint of antennæ grey above; "beard" white. Head narrower at level of vibrissæ than at origin of antennæ. Two stout macrochetæ on vertex behind ocelli, orbital bristles present; three smaller bristles above vibrissæ, which latter are situated above level of the oval margin; sides of face bare. Antennæ fuscous, 2nd joint rather less than ½ third, 3rd joint compressed, extremity truncated and widened, upper edge concave; arista thickened gradually, tapering to a point, basal joints well developed. Eyes with pale hairs. Proboscis black at base, suctorial portion brown. Palpi minute black, with a terminal long black hair. *Thorax* grey, with four dorsal longitudinal narrow black bands, not extending to scutellum, with three post sutural macrochetæ (above base of wing) and three sternopleural ones; scutellum with four pairs of marginal macrochetæ, central ones smaller. *Abdomen* elongate, testaceous-brown; the centre of the back occupied by a broad black band that widens generally posteriorly (so as to occupy greater part of width of 4th), and, moreover, expands towards the posterior border of each segment; venter with a central black spot on each, and an additional lateral one on each side of the 4th and 5th segments; 2nd abdominal segment with two and 3rd segment with six macrochetæ on posterior border; those on 4th nearly hidden by long bristles. *Legs* testaceous-yellow, rounded spot at base, and elongated spot at extremity, and tarsi black; pulvillus of foot white. *Wings* with 1st longitudinal vein bare, 4th longitudinal reaching fore-border rather less than half-way from tip of 2nd to apex; small cross vein opposite middle of discal cell. *Tegulæ* white. Length, 12 mm.

B. Predaceous Insects.

In addition to the true parasites of the *Leucania* caterpillars, there are other insects belonging to Beetle (*Coleoptera*), Bug (*Hemiptera*), and other families that prey upon them, and either suck out the fluid contents of their bodies or consume their tissues.

Amongst these the most conspicuous, although not the most prevalent, is a large beetle belonging to the family Carabidæ, and named *Calosoma australis*, Hope. This beetle may attain a length of an inch, and maximum breadth of half-an-inch. It is nearly black beneath, but its upper surface is of a brilliant dark-green colour, and its wing-covers are striated with numerous punctured lines. These features, as well as its general form, are represented in Fig. 1 of Plate CLXXIV.

The *Calosoma* beetle runs over the surface of the ground in quest of its prey, but its secluded habits and activity, as well as the fact of its being for the most part nocturnal, prevent its being observed as frequently as might otherwise happen. It is, however, a voracious feeder, seizing its victim in the first instance in its formidable jaws, and no doubt renders considerable service.

C. Birds.

Allusion has already been made to the service performed by birds in limiting the numbers in which these caterpillars occur. When a visitation of caterpillar hordes is being experienced, native birds, as a rule, are not numerically sufficiently strong to accomplish very noticeable benefit. It is, however, during seasons in which these marauders do not assert their destructive capabilities that the useful work of these friends of the farmer is performed. At these times they largely contribute to maintain the numbers in which these insects occur within safe limits. Amongst them may be specially mentioned, not only such birds as Laughing Jackasses (*Dacelo gigas*), the Pied Crow Shrike (*Strepera graculina*), the Magpie (*Gymnorhina tibicen*), Butcher Birds (*Cracticus spp.*), Magpie Larks (*Grallina picata*), the Mutton Bird (*Corcorax melanorhamphus*), the Crow (*Corvus australis*), the Curlew

* Related Tachinid parasites of *Leucania unipuncta* have been met with in other countries. Thus F. M. Van Der Wulp has described, as occurring in British India, a Tachinid parasite of *Leucania extranea*, Guen. (synonymous with the *Leucania* under notice), with the designation *Masicera castanea* (Indian Museum Notes, III., page 12, 1894), from which the present insect differs by marked structural features—the minute palpi and hairy eyes, amongst others. D. W. Coquillet has also recorded three related parasites as victimising *Leucania unipuncta*, Haw., in North America:—*Belvosia unifasciata*, Dsv.; *Phorocera leucaniæ*, Coq.; and *Winthemia 4-pustulata*, Falv. (Tech. Ser. 7, Div. Ent. U.S. Dep. Ag.)

(*Œdicnemus grallarius*), the Plover (*Lobivanellus lobabus*), but also the smaller Fly Catchers proper, not excepting even the diminutive Blue and Red-backed "Wrens" (*Malurus spp.*). There are, however, some birds that accomplish even greater work than these, and reduce the numbers of the caterpillars to a very appreciable extent when they occur in the myriads that are sometimes encountered. The Straw-necked and White Ibises are especially alluded to in this connection. These not only feed over the grass lands in flocks of thousands, but visit the cultivated lands, should the crops be not too high, in immense numbers also. And when the caterpillars have gone into the soil to pupate, they will even search for them with success with their long beaks, probing the earth in all directions.

D. Disease.

The consideration of the subject of disease in caterpillars—caused by either bacteria or by fungus germs, and its possible propagation by artificial means—is postponed.

REMEDIES.

1. The effectual exhibition of remedial measures implies a prompt recognition of the presence of the caterpillars. As a rule they may be long present in a growing crop and yet escape observation, simply because their injuries are not sufficiently pronounced to betray their occurrence. It is, therefore, expedient that the farmer inspect from time to time his growing crop, especially early in August and February, and pull up here and there some of the ranker growing clumps or stools, and shake these well with a view to discovering the immature caterpillars—pale miniatures of the pest as ordinarily perceived. This remark is prompted by the experience, that usually it is not until the caterpillar is full-grown and has almost completed, not only the first phase of its existence, but also all the injury that it is capable of inflicting, that measures of repression are sought out.

2. Moreover, as it often happens (though the reverse may occur) that the whole area of a plot in crop is not simultaneously attacked, but different parts are visited successively, it will be found generally practicable to isolate the earlier infested portions, if narrow roads be left intersecting the area under cultivation, to contain ditches or furrows that may be ploughed or dug along them.

3. Although generally it is expedient to sow early and raise a quickly maturing crop in view of the probability that rust may assert its presence, it is expedient, having regard to the probable occurrence of caterpillars, to so arrange the time for sowing that the plants constituting the crop will not be sufficiently advanced at the time that the moths are about to afford a suitable location for their eggs. And in deciding the probability of such an occurrence it is necessary to note two things:—1st. The extent to which the caterpillars and chrysalises constituting the immediately previous infestation have been victimised by parasites; and 2nd, the degree of prevalence of the parent moths. The former may be generally inferred by the comparative numbers in which moths visit the lights in the house after nightfall; and the latter by submitting uninjured chrysalises, in earth, to the Department for examination. It must be added, however, that, though June is probably the best month to sow on the Darling Downs some cereals (*e.g.*, oats), still, owing to the dryness that generally prevails then, germination may not take place.

4. When caterpillars are early perceived in the young growth it will be often expedient to feed it off with sheep or cattle. The trampling of stock is very fatal to pests of this description, and the act of feeding on the part of cattle also destroys them, even where they are not killed by exposure and by partial deprivation of sustenance.

A similar result may be accomplished by passing a heavy roller over the land, as, having soft bodies, they are quite readily injured; but this procedure, as also the preceding, can only be successfully resorted to when the growth is

quite short. The use of a roller, under these circumstances, will be especially serviceable when the ground is firm and smooth. The presence of a strong stubble, in the case of a second growth of green fodder having to be dealt with, will, of course, too, interfere with its use. A roller, moreover, cannot be advantageously employed at times when it would quickly become covered with adherent soil, for this would produce results somewhat similar to what would be attained were the surface naturally uneven.

5. In many cases, as previously suggested, fields owe their visitation of caterpillars not to the fact that the moths have earlier deposited their eggs on the plants constituting the crops growing thereon that are the object of attack, but, on the other hand, to migration of caterpillars from adjacent ones. The same remark applies also to different plots in the same field. That this has been the case has been shown in many instances in the course of this investigation. It becomes, therefore, expedient to adopt measures to protect the still unvisited cereal or grass crops. This may be effected by the adoption of one or other of the following measures:—Surround the infested area with a ditch or furrow. If the ground be loose or rubbly in accomplishing this, plough in succession two or more furrows, as deep as practicable, with a double mouldboard plough, making the sides as loose as possible by dragging brush along it. Moreover, should coal tar or gas lime be sprinkled along one of these, a still more effectual barrier will be secured. When the soil is, on the other hand, not loose, but sufficiently firm to allow of one side of the furrow remaining perpendicular or even overhanging, a standing crop, under the circumstances alluded to, may be protected by constructing a special form of ditch such as is described in the following quotation:—"The worms [writes the late Dr. C. V. Riley] may be prevented, as a general thing, from passing from one field to another by judicious ditching. It is important, however, that the ditch should be made so that the side towards the field to be protected be dug under. About every three or four rods a deep hole in the ditch should be made, in which the worms will collect, so that they can be killed by covering them with earth and pressing it down. They may also be destroyed by burning straw over them—the fire not only killing the worms but rendering the ditch friable and more efficient in preventing their ascent" (*Report Commissioner of Agriculture*, U.S.A., 1882, page 96). The holes in the ditches alluded to trap the caterpillars as they wend their way along the bottom of the ditch in their effort to pursue their onward march to pastures new; and when in these an ordinary rammer will despatch them.

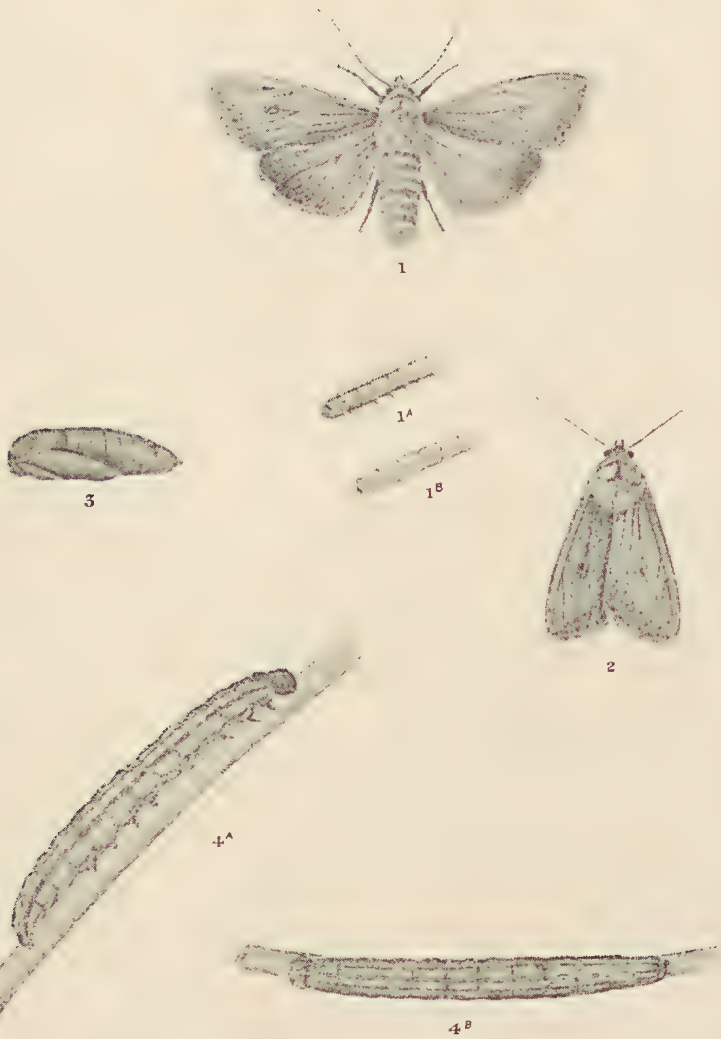
Experiments on my part have shown that the caterpillar will not eat fodder that has been moistened with a comparatively weak solution of either iron sulphate or copper sulphate (bluestone), even after such fodder has been subsequently dried off; or, if it does so—as may happen when the former of these reagents has been used—only sparingly so, and with apparent reluctance. It may, therefore, prove advantageous, by way of protecting plant growth, to spray it with one or other of these solutions. The necessity for protecting young maize plants from caterpillars travelling from an adjacent field of wheat, oats, or other cereal seems to afford an instance in which this procedure might be not only practicable but also successful. However, the possible injury to the plant from the use of too strong solutions must be anticipated.

Again, with a like object in view it will often be found profitable to poison a broad strip of herbage immediately in advance of a travelling host of caterpillars. Paris Green or London Purple may be used for this purpose. [If the former be employed, that bearing the brand of Messrs. Blundell and Spence, and sold in 1-lb. packets, is recommended in preference to other forms of the article on the market, as having a composition fairly uniform.] These poisons may be exhibited either in water or with some dry diluent as a powder. In the former case 1 lb. of Paris Green or ¾-lb. of London Purple, having been first made into a paste, should be mixed with 150 gallons of soapy water to which a like weight of fine lime has been previously added (*i.e.*, at the rate of 1 teaspoonful Paris Green to 1½ gallons

Plate CLXXII.

WHEAT.—Head of Stool showing Injury by Caterpillar

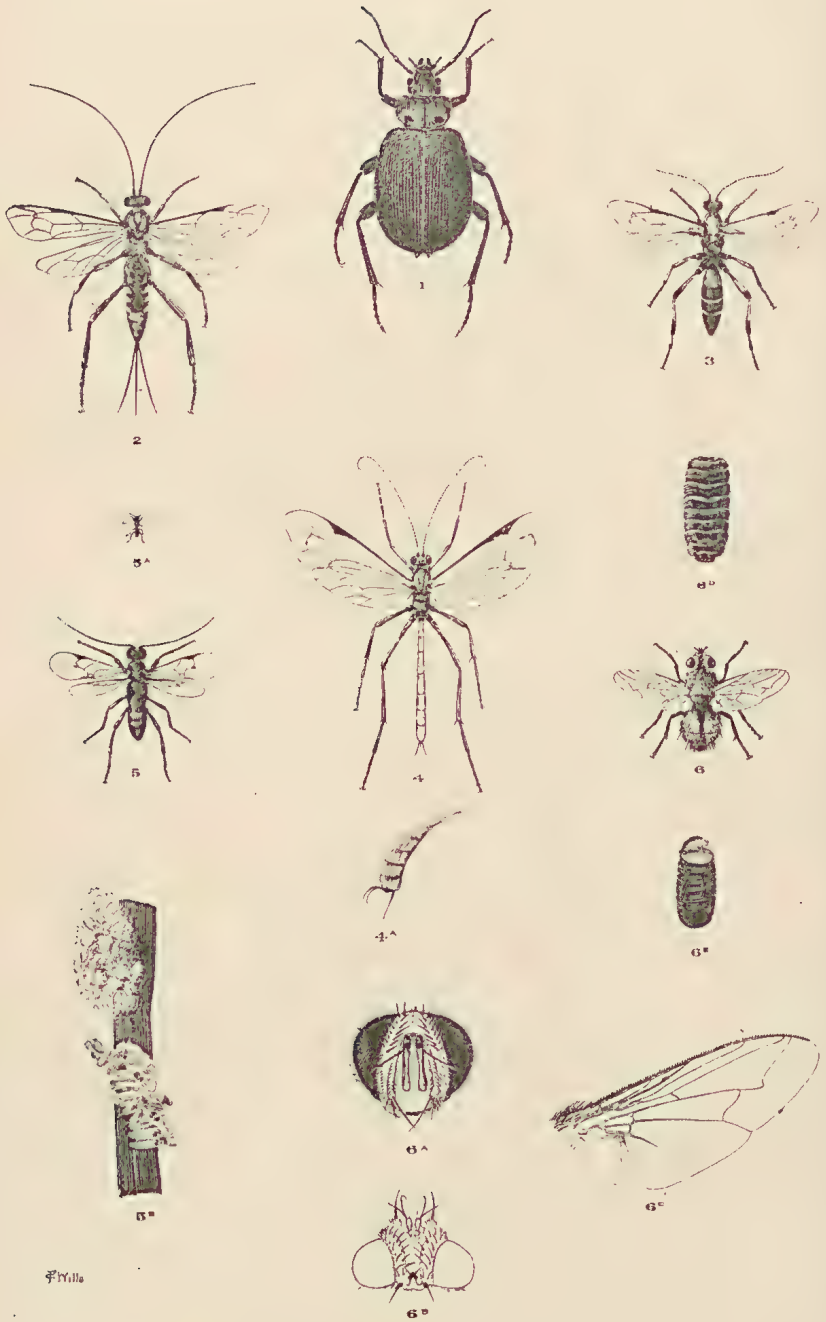
Plate CLXXII.



F.C. Wills

LEUCANIA UNIPUNCTA, Haw.

Plate CLXXIV.



NATURAL ENEMIES OF LEUCANIA UNIPUNCTA, Haw.

water), and the whole wash be kept well stirred whilst being applied. In the latter case it may be mixed with flour, or plaster of Paris, 1 lb. of Paris Green being mixed with 40 to 50 lb. of the former, or 100 lb. of the latter. These poisons, if used dry, should be dusted over the plants, having been first placed in a bag, made of some pervious material that is to be fastened to a pole, (two such bags, one at each end of a pole, may be placed across a horse's back, and the animal led over the ground it is proposed to poison, when the jerking will liberate the poisonous dust). If applied in the form of a wash, the mixture may be distributed by means of a watering cart, or Strawsonizer, or other similar apparatus. When the strip of poisoned fodder has served its purpose, it should be mowed down and burnt, to prevent its being consumed by stock prior to its being rendered innocuous by exposure to successive showers of rain.

6. The fact that the insect hibernates as a caterpillar, and frequently may exist in the egg condition in dry grass and stubble, and, moreover, habitually frequents rank herbage, suggests the expediency not only of maintaining the headlands of fields clean and free from weeds, but also of periodically firing pastures. This should be done even when visitations of caterpillars are not immediately impending, as the insect always exists in these situations in greater or less number, and will, under favouring climatic conditions, the existence of a paucity in the numbers in which its natural enemies occur, or the lessened effectiveness of natural checks, generally multiply to a highly prejudicial extent.

7. Under certain special circumstances the moth may be captured by trap-lanterns, or killed by attractive poisoned sweets. The conditions under which crops are grown in Queensland are, however, such that their use is not likely to be attended with any marked result.

8. The fact of domestic poultry being very partial to insects, and caterpillars especially, might be utilised in repressing these in ordinary seasons; the difficulty that is experienced in getting certain varieties to roam far from their roosts being overcome by the use of transportable fowl-houses, as recommended in the writer's Report on the Grub Pest of Sugar-cane: these houses to be moved over the standing crop when this is but little grown and the caterpillars are still young.

9. Farmers interested in caterpillar repression should make it their business to strenuously oppose the destruction of all insectivorous birds and their eggs; especial allusion being made to such birds as are hereafter mentioned.

Description of Plates.

Plate CLXXII.

Head of Stool of Wheat, as injured by *Leucania* Caterpillars. From photograph by C. J. Wills.

Plate CLXXIII.

Fig. 1. *Leucania unipuncta* Moth. Natural size. 1 *a*, portion of antenna of male; 1 *b*, portion of antenna of female. (Magnified representations.)
" 2. *Leucania unipuncta* Moth. Position of rest.
" 3. Chrysalis.
" 4. Caterpillar. Dorsal and lateral views.

(From Drawings by C. J. Wills.)

Plate CLXXIV.

Fig. 1. Predaceous Beetle—*Calosoma australis*, Hope.
" 2. Red Ichneumon—*Theronia rufipes*, n. sp. Female.
" 3. Banded Ichneumon—*Exephanes leucaniæ*, n. sp. Male.
" 4. Tawny Ichneumon—*Paniscus* (*productus*, Brullé ?). Female.
" 5. Social Ichneumon—*Apanteles ruficrus*, Haliday (enlarged representation). 5 *a*, Natural size; 5 *b*, Pupa cocoons.
" 6. Tachina Fly-parasite—*Linnæmyia nigripalpus*, n. sp. 6 *a* and 6 *b*, Face (magnified representation); 6 *c*, Wing (enlarged representation); 6 *d*, Larva (white in nature); 6 *e*, Cocoon from which fly has emerged.

(From Drawings by C. J. Wills.)

General Notes.

TREATMENT OF SNAKEBITE.

ALTHOUGH cases of snakebite are not very frequent in this colony—notwithstanding the fact that some localities, especially in the neighbourhood of swamps, are infested by several species of venomous snakes—yet all bush workers, plantation and farm hands, swagmen, and others who are in the habit of camping out, are liable to tread unawares on one of the reptiles and receive a dangerous bite; and this may happen at a distance from medical assistance. We therefore publish the following directions for the immediate treatment of snakebite, by Dr. J. Ashburton Thompson, Chief Medical Officer of the Government Health Department, New South Wales:—

DIRECTIONS.

A ligature—that is, a strong string tape, narrow strip of clothing, or handkerchief—should be tied at once round the limb *above* the bitten part. When it has been tied, pass a piece of stick under it, and twist it round and round so as to screw up the ligature as tightly as you can. Leave the stick in the twisted ligature, and secure the end by another string around the arm above the ligature. Great pain and swelling are caused by this, but cannot be avoided.

At the end of half-an-hour undo the ligature for 5 minutes; then tie and screw up again. At the end of another half-hour the ligature may be removed altogether.

In places where a ligature cannot be tied, as on the neck or face, pinch up the bitten part between the finger and thumb, and cut it out.

In any case the bitten part should be cut into by numerous little cuts over and around the bite, for about 1½ inches around, and sucked by the mouth freely and perseveringly; and this can be done without danger by any person.

Stimulants, such as brandy, whisky, gin, rum, in small quantities at a time (a few teaspoonfuls), or strong tea or coffee, or wine, may be given if the patient be faint.

We would draw particular attention to the second paragraph in the above directions, which directs the ligature to be removed in half-an-hour and afterwards replaced.

A case occurred a little while ago in Queensland which demonstrated in a fatal manner the necessity for relaxing the ligature. A person came in from the bush to be treated for snakebite by a doctor. If we recollect rightly, the patient had doctored himself properly in so far as scarifying and sucking the wound and applying a tourniquet; but unfortunately he had kept it on for some hours, and mortification had set in. Amputation of the arm was resorted to, but the patient died.

Stimulants are often given to excess with dire effects, and it is not outside the experience of medical men that sufferers from snakebite are really often sufferers from overdoses of spirits, having been bitten by some non-venomous snake, and would have recovered without any stimulant. We would strongly urge upon all teachers and parents to get some good work on Australian snakes, and instruct their pupils and children in the method of determining whether a snake is poisonous or not. This might save many a finger, and possibly many a life, for there are nervous people who are prone to collapse even at the sight of a snake. Many well-educated people, and most children, believe lizards—including the jew lizard and so-called iguana and frilled lizard—to be venomous; when, as a matter of fact, we believe there is only one known species of venomous lizard in the world.

SPREADING DEVICE FOR HORSES' HOOFS.

An American device for the spreading of horses' hoofs is ingenious, and at the same time simple and inexpensive. Not only does the invention cure lameness, but it is a preventive as well. It consists of a metal yoke-piece bent to conform to the contour of the hoof on which it is to be applied with an inwardly bent hook member at each end, adapted to engage the rear ends of the coronary band on the hoof of the animal. The yoke-piece shown in the diagram is preferably of thin steel, and when in position inclines upwardly and forwardly, encircling and fitting closely on the hoof. The device is preferably employed in connection with a light shoe formed on two pieces jointed at their forward ends, the shoe having at its rear ends hooked lips, which engage the coronary band. When it is desired to spread one-quarter of the hoof only, the point of the shoe is placed at one side of the toe, instead of centrally, and one hook member, and the yoke-piece is made to engage with a notch in the shoe instead of with the coronary band, the full force of the expansive spring then being exerted to spread the hoof on the other side. The moderate pressure, constantly applied in this way, is adapted to gradually effect the desired divergence of the parts, relieving sensitive portions and promising a better circulation.

A SIMPLE FILTER.

There are several simple modes of making a filter. A very cheap, simple, and effective filter can be made by means of a common flower-pot. All that is requisite is to fill the hole with a piece of sponge, and then place in the pot alternate layers of sand, charcoal, and small pebbles. The flower-pot thus fitted up may be placed in a jar, or other convenient vessel, in which the water as it filters through can be received. The effectiveness of this filter can be very much increased by having two or three flower-pots placed under each other in a stand, the water dripping from one to the other into a receiver below. A good filter may be made by placing in a tank of impure water a vessel so arranged that a sponge which it contains shall lap over the edge and dip into the water of the tank. The sponge gradually sucks up and purifies the water in the reservoir, and allows it to drop into the smaller vessel or receiver, from which it may be drawn off by a tube. By placing a few lumps of charcoal at the bottom of the receiver, filtration of the most perfect kind is effected.

ACIDITY IN LEMONS.

Lemons have a tendency to lose their acidity if neglected in cultivation. This was found to be the case in America, with the result that investigations were made. With reference to this an exchange remarks:—Some people have an idea that lemons are sour because they cannot help being sour, but this is a mistake. They are made sour. Until quite recent years the lemons of California were open to the objection that they were not sour enough. They had plenty of juice, but they also had a high percentage of sugar, with so small an acid content that they were practically unmarketable. Some years ago, however, the growers made up a purse and sent an investigator to the lemon regions of Southern Europe to pick up a few tricks of the trade for the general benefit. The result was that in California they now pick the fruit before it begins to turn yellow, and put it in a curing-house at about 50 degrees for some three weeks while it "sweats out" the sugar. It is then

placed in another temperature for a couple of months, after which it is ready for market, the desired acid quality having been thus developed. Another effect of the curing process is to make the skin thin. Originally, when taken from the tree, the lemon skin is thick and tough, but as the acid is developed it seems to eat it down and render it quite thin. On this subject Mr. A. H. Benson says:—When the lemon is allowed to become over-ripe, it develops a very thick skin, and the juice loses a portion of its acidity. In order to prevent this, the fruit is cut when green or just as it is beginning to turn colour, and is sweated, as described, at a temperature of about 50° F.

HOW TO PICKLE PORK.

Procure clean, new oak barrels for pickling. When the pork has been cut up, first be sure that the animal heat is entirely out of it, and that it is completely cold. See also that there is no blood on the pieces or joints, nor bloody scraps. Cover the bottom with an inch of dry, coarse salt; then pack the pork in even layers, the skin coming in contact with the barrel in a circle; pack the pork in even layers and as compactly as possible; cover each layer with 1 inch of salt, filling in all the vacant places. When the barrel is filled cover the top layer with 1 inch of salt, make a strong brine and fill the entire barrel, so that the meat will be completely covered by it. There is no danger of clear, fat pork becoming over-salted, no matter how much salt may be used, since it will only take up a certain amount of it, and any surplus will remain in the brine. Some put a small quantity of saltpetre into each barrel, which hardens the pork somewhat. Usually from 40 lb. to 50 lb. of salt are required for each barrel. The pork must be kept well covered with brine, and the barrel should be looked to occasionally to see that it does not leak.

A STATE DAIRY.

A State dairy is to be erected at the Dookie College, in Victoria, capable of treating the milk from 100 cows.

A FLOUR-TESTING MILL.

Following the example set by Mr. Guthrie, the New South Wales Departmental chemist, whose valuable experiments are becoming very widely known, the South Australian Department of Agriculture has ordered a Ganz flour-testing mill from Buda-Pesth, which will be erected at the School of Mines. At present (writes the *Journal of Agriculture* of South Australia) a great deal too many varieties of wheat are being cultivated, with the result that the average sample is uncertain and of inferior milling quality. Naturally, some varieties of wheat are of much greater milling value than others, and the admixture of inferior qualities must depreciate the value of the flour. Even supposing the different qualities are kept separate, and are ground separately, the miller cannot afford to ruin his reputation by turning out ever-varying qualities of flour. Half-a-dozen varieties of wheat of first-class milling quality, heavy bearing, hardy, and rust-resistant, ought to be sufficient for the requirements of South Australian farmers; instead of this there are about 1,600 named varieties of wheat being tried in the colonies.

TIMBER SEASONING BY ELECTRICITY

During the last few years considerable attention has been given to the invention of new processes for treating timber. The latest aspirant to fame is a process and apparatus which claims to give to timber properties which time alone has so far been able to produce. It is a French idea, and has, we are informed, met with considerable success in Paris, where works have been established to treat timber on a large scale. The Nodon-Bretonneau process involves the expulsion of the sap and its replacement by a solid matter, insoluble and aseptic. This is effected by placing the material to be treated in a vat containing a lukewarm solution made up of borax, 10 per cent.; resin, 5 per cent.; and ·75 per cent. of carbonate of soda. While in this bath, an electric

current of about 100 volts pressure is caused to pass through the timber. The current sets up what is termed electro-capillary attraction, and drives out the sap by the introduction of the solution. This treatment lasts from six to eight hours generally, after which the wood is subjected to a further treatment of a few hours' duration in a warm bath to allow of thorough permeation of the entire section. It is then removed and dried under cover by air currents, a process which is said to take from 14 days to 2 months, according to the density and thickness of the material. The inventors claim that not only is a considerable saving in time and expense in the drying of timber effected by this process, but that certain classes of wood, such as maritime pine, which have not hitherto been readily saleable owing to the large amount of moisture they contain, can by its use be readily deprived of the sap. The expenditure of electric current is said to be 600 watts per cubic metre per hour for 5 hours. The Electric Timber Seasoning Company, Victoria street, Westminster, is introducing the system into this country, and a model apparatus has been fitted up at the work of Messrs. Johnson and Phillips, Charlton Junction.—*Engineer.*

CUCUMBERS, APPLES, AND ONIONS AS FOOD.

Many people are under the impression that cucumber is very indigestible; and when they eat it they do so under protest, and with apprehensions of possibly dire consequences. How this delusion can have arisen it is difficult to say, unless it be that cucumber is often eaten with salmon and other indigestible table friends. It is not the cucumber, however, but the salmon that sits so heavily on our stomach's throne. Cucumber, in fact, is very digestible when eaten properly. It cannot be otherwise, when it is remembered that it consists mainly of water, and that those parts which are not water are almost exclusively cells of a very rapid growth. In eating cucumber it is well to cut it into thin slices, and to masticate them thoroughly. Even the vinegar and pepper that are so often added to it are of service to digestion, if not taken in excess. The cucumber, as almost everyone knows, belongs to the melon tribe.

Apples, it is stated, contain a larger amount of phosphorus than any other fruit or vegetable; and on this account they are very important to sedentary men, who work their brains rather than their muscles. They also contain the acids which are needed every day, especially for sedentary men, the action of whose liver is too sluggish to eliminate effete matter, which, if retained in the system, produces inaction of the brain, and, indeed, of the whole system, causing sleepiness, scurvy, and troublesome diseases of the skin.

The use of raw onions with daily food tends, says Dr. Fernie, to preserve from infectious diseases.

DESTRUCTION OF RATS.

Precipitated barium carbonate (100 grams) and tartar emetic (1 gram) are mixed with baked flour and glycerin, and made up into 2-gram boluses, which are fried brown in hot fat. Gypsum, 2; oatmeal, 750; flavoured with anise oil. Plaster of Paris and sugar, equal parts. The mixture is spread on a plate, and exposed near a vessel of water. Crushed bitter almonds, 60; lard; fresh squill bulbs, equal parts. Powdered almonds mixed with arsenic answer well.

RAT CAKES.

A bulb of squill is cut into thin slices, dried and mixed with sugar, flour, and a little salicylic acid. Make into cakes with glycerin and with sugar, and expose them by the side of the water.

MOTH AND CATERPILLAR LIME.

Venice turpentine, 200; resin, 1,000; turpentine, 140; tar, 80; lard, 500; rape oil, 240; tallow, 200. Resin, 50; lard, 40; stearine oil, 40. Resin, 3; rape oil, 4; lard, 2; soft soap, 1; wood tar, 10. Resin, 36; rape oil, 36; Venice

turpentine, 20; wood tar, 5; turpentine, 3 parts. Paint the mixture while warm on strips of paper laid smoothly on the tree-trunk about a yard above the ground. This should be done at the end of the autumn to prevent the females of the winter moth from climbing up the trees. Instead of the above mixture, cart-grease may be used. Mix melted resin with crude rape oil to form a mass of sticky consistence.—*Gardener's Chronicle.*

HOUSEHOLD HINTS.

"Marie," who sends many excellent household hints to the *Agricultural Gazette*, London, gives the following:—

RECIPES FOR HOME-MADE SAUSAGES.

Most farmers in this colony kill a pig or two in the winter for home consumption, and there are doubtless some housewives who will be glad of a new idea in using the portion of the animal to be eaten in a fresh state.

It is quite true that when purchased from a really trustworthy, reliable dealer bought sausages are, as a rule, exceedingly nice and most dainty, but in spite of this fact I think my readers will agree with me in saying that the majority of people decidedly prefer those which are made at home, as then perfect purity and cleanliness can be safely guaranteed, which is no small recommendation. I should advise every housewife, therefore, who can, to buy a small handy sausage-machine, if she does not already possess one, and to have the work, which is not at all laborious, performed at home under her own careful superintendence. It is a good plan, too, to keep a small stock of different kinds of sausages on hand whenever possible, as they lend themselves to so many dainty methods of cooking and serving that they prove quite a boon to the housewife when she is called upon—as very often happens—to provide for unexpected guests at a very short notice.

Tastes vary very considerably in respect to sausages; some people like a much larger proportion of fat than others do; some like bread mixed with the meat, while others object to it; and sometimes one kind of meat and certain seasonings are very much preferred to others, but, of course, these are points which must be left for the housewife to settle. As a help, however, I should like to give a few recipes which I know to be really excellent and sufficiently dainty to suit even the most fastidious.

PORK SAUSAGES, No. I.

Just one word, before giving the recipe, regarding the skins which are to be filled. The greatest care must always be taken to see that these are scrupulously clean. Sometimes they can be procured all ready for use, but, if they have to be prepared at home, proceed as follows:—After the skins have been turned out and emptied, lay them in cold, well-salted water, and let them remain for several hours, changing the water very frequently; then, when thoroughly clean, drain well and wipe them quite dry with a clean soft cloth, when they are ready for filling.

Take 8 lb. of lean and 2 lb. of fat pork; free it entirely from bones and gristle, and cut it into pieces 1 inch square Mix together 4 oz. of salt and ¼-oz. of saltpetre, 1 oz. of pepper, and 1 oz. of mixed powdered herbs, and spread this over the meat before mincing. Pass the mixture through the machine, fill the skins, and if any air spaces appear prick them with the point of a needle; this helps to prevent the sausages bursting during the process of cooking, always a most annoying occurrence. Hang the sausages in a cool, airy place until required.

PORK SAUSAGES, No. II.

Take 2 lb. of white bread, without crust, and soak it in milk and water, to which a little salt has been added. When quite soft and swollen out to the full, turn it into a clean cloth, and gently press out all the moisture. Add this to the same quantity of pork as given in the last recipe, and mix thoroughly. A nice change can be effected in the seasonings by the addition of a little extra sage, thyme, or marjoram, and a very small quantity of finely chopped onion,

which has been boiled previously until quite tender; but whatever the seasonings consist of, they should be mixed with the meat before the mincing commences, as this, of course, ensures the ingredients being all properly blended. The addition of bread renders pork sausages much more suitable for persons whose digestive powers are rather doubtful, as it absorbs part of the fat, and takes away the extreme richness of the meat. Finish the sausages off as already directed.

GERMAN SAUSAGES MADE AT HOME.

Cut up 10 lb. of lean raw pork into dice, and season it with 6 oz. of salt, 1 oz. of pepper, and ½-oz. each of powdered sage and marjoram; then add a little of the blood to moisten and to darken the colour, and, after mixing well and passing the meat through the machine, add 2 lb. of fat raw pork, cut up into small dice or strips about 1 inch long and ¼-inch square; then mix again and press the preparation lightly but firmly into ox-skins. When the skins are filled—but not too full—tie them securely in the desired lengths, and put them into a saucepan with plenty of cold salted water; set this on the fire, allow the water slowly to reach boiling point, then draw the pan a little to one side, and simmer them for an hour. When done enough, take up and dip them very quickly into cold water, dry carefully, and hang in smoke for a few days. The dipping into cold water hardens the outer skin, and so the meat is better preserved. These sausages are most convenient things to have in the house, as they can be used in so many different ways. If placed between slices of thinly-cut, well-buttered bread, they make most delicious sandwiches; or they are exceedingly nice when simply cut into slices and arranged on a pretty dish with a tasteful garnishing of fresh parsley. They often come in useful, too, for garnishing other dishes. The smoking adds considerably in the estimation of most people to the delicacy of the flavour.

BEEF SAUSAGES.

These are prepared in exactly the same manner as pork sausages, only substituting lean beef and fat bacon for the pork, the seasonings, of course, being regulated according to taste. When properly prepared, the meat may be put into small skins, and cooked in the usual way when required; or it may be put into large skins, and be cooked, smoked, and served as directed for German sausages.

VEAL AND HAM SAUSAGES.

These are generally made only in a small quantity at a time as a special treat. The ingredients required are, say, 2 lb. of fresh veal, and 1 lb. of prime ham, in the usual proportions of fat and lean, ¼-lb. of breadcrumbs soaked in milk and squeezed dry, and plenty of seasonings according to taste. Prepare and pass through the machine in the usual way, then fill in very small skins, twist in lengths of about 2½ inches, and hang in a cool place until required.

A HEAVY CROP OF MAIZE.

A yield of 100 bushels of maize per acre was no uncommon thing in Queensland when the rich scrub lands were first put under crop, but we never heard of double that quantity per acre being harvested. The *American Agriculturist* lately offered a prize of £100 for the best acre of maize grown; 45 acres were entered, the winning acre producing 255 bushels and the lowest 51 bushels, the average being 104 bushels. This reminds us of the story of the Kentucky farmer who was boasting of the fertility of his land, and told his hearers that he grew 12 stalks of corn in every stool, each stalk carried 10 well-filled cobs, and there was a gourd full of ready-shelled grain on top of each.

EGGS IN LONDON.

The opening up of a trade in eggs between Australia and England makes the following list of prices (per 120) as given in Oetzes and Gerritsen's circular of interest:—French extras, 12s. 6d.; best, 11s. 6d.; seconds, 10s. Italian extras,

11s.; selected, 10s. 6d.; seconds, 9s. Hungarian, blues, 8s. 9d.; reds, 6s. 9
Austrian, blues, 7s. 9d.; reds, 6s. 6d. Russians, best, 7s. 6d.; ordinary, 6s. 9
7s. Danish, 9s., 14s.

Under the heading "Eggs from Australia," the *Farmer and Stockbreed* says:—At last it has come. The country the furthest removed from us in th round world has started supplying us with eggs. Last week mention was ma in the "F. and S." as to the increase in the value of eggs imported into th country this present year, and now I read of an experimental consignment fro Australia. A steamer has sailed carrying, among other cargo, a million eg from Melbourne to London. In Melbourne, it seems, eggs are now selling 7d. a dozen, and the exporters believe the venture will be profitable. I ventur to doubt it. Very tolerable cooking eggs can be bought in London or in th country towns now for 1d. apiece. There are, of course, foreign or preserve English eggs. It is doubtful if the Australian eggs will retail even as hig as 1d. each, unless they are of extra good size. For the difference, th exporters have to pack the eggs, ship them for a six weeks' journey in a co chamber on shipboard, and sell them in this country to buyers who, in tur have to sell them to customers who, it is doubtful, will give 1d. each for them It is certainly wonderfully enterprising, but how can it answer? Incidentally the fact we have paid over four millions for foreign eggs alone in ten month points to the importance of eggs as an article of diet.

THE WHEAT CROP OF 1899-1900.

All over Australia (says the *Queensland Mercantile Gazette*), with the exceptio only of Queensland, the harvest is expected to give a bountiful return to th farmer. The Mother Colony is estimated to produce 13,250,000 bushels, whic will leave a surplus for export of about 3,000,000 bushels. In Victoria th yield is not quite equal to last year, but a surplus is expected of about 12,000,00 bushels. South Australia, with the small average of 5 bushels to the acre, expected to produce 10,000,000 bushels, which will give a surplus for export about 6,500,000 bushels. The other large wheat-producing country in th southern hemisphere is the Argentine, where the crop this season is heavy, surplus of 75,000,000 bushels being expected.

In Queensland, only a few months ago, it was confidently expected tha this season's crop would reach nearly 2,000,000 bushels, but the very severe frosts which visited the Downs in October caused widespread destruction Large areas were completely destroyed, and the mowing machines had to be put in the fields in order to prevent a total loss. In some places, however, very good yields are expected, principally in the Warwick district, where we hear of some farmers having reaped as much as 30 to 40 bushels to the acre. It is very difficult to estimate the Queensland wheat crops. The Government machinery for arriving at the figures is, as we have pointed out before, very imperfect. Not only is the information not available until too late in the year to be of value but when it is forthcoming it is not very reliable.

The statistical information of the southern colonies was sufficiently well advanced to be published early this month while practically nothing is yet known of the result of the wheat harvest of this colony, nor is it likely to be for some months.

The Warwick *Argus* a short time ago estimated the crops of the Warwick district to total about 450,000 bushels. Last year, according to the returns of the Registrar-General, the Warwick district contributed rather less than half of the total yield of wheat of the Southern division, so if the result is the same this year the total crop of wheat would be about 1,000,000 bushels. We are inclined to think, however, that the quantity of wheat available for flour this season will not much exceed 750,000 bushels. This quantity will be sufficient to supply food for the entire population of the districts of Darling Downs, Maranoa, Warrego, and South Gregory, and leave about 350,000 bushels to come east of the Main Range.

The Markets.

AVERAGE PRICES FOR DECEMBER.

Article.		DECEMBER, Top Prices.		
		£	s.	d.
Bacon	lb.	0	0	7
Bran	ton	5	16	3
Butter, First	lb.	0	0	$9\frac{7}{8}$
Butter, Second	„	0	0	$7\frac{1}{8}$
Chaff, Mixed	ton	3	2	6
Chaff, Oaten	„	4	2	6
Chaff, Lucerne	„	3	5	0
Chaff, Wheaten	„	2	15	0
Cheese	lb.	0	0	5
Flour	ton	9	2	6
Hay, Oaten	„	3	8	9
Hay, Lucerne	„	2	2	6
Honey	lb.	0	0	$1\frac{1}{2}$
Rice, Japan (Bond)	ton	16	3	0
Maize	bush.	0	4	$1\frac{1}{4}$
Oats	„	0	3	$4\frac{1}{2}$
Pollard	ton	6	1	$10\frac{1}{2}$
Potatoes	„	3	18	9
Potatoes, Sweet	„	1	13	$1\frac{1}{2}$
Pumpkins, Table	„	2	10	0
Sugar, White	„	15	7	6
Sugar, Yellow	„	12	11	3
Sugar, Ration	„	10	11	3
Wheat	bush.	0	3	$4\frac{1}{2}$
Onions	cwt.	0	5	0
Hams	lb.	0	0	$10\frac{1}{4}$
Eggs	doz.	0	1	$0\frac{1}{4}$
Fowls	pair	0	4	$2\frac{1}{4}$
Geese	„	0	6	$10\frac{1}{2}$
Ducks, English	„	0	3	$5\frac{1}{4}$
Ducks, Muscovy	„	0	5	$10\frac{1}{2}$
Turkeys, Hens	„	0	9	$4\frac{1}{2}$
Turkeys, Gobblers	„	1	3	9

ENOGGERA SALES.

Article.	DECEMBER. Top Prices.		
	£	s.	d.
Bullocks	7	13	4
Cows	5	11	8
Wethers, Merino	0	14	1
Ewes, Merino	0	9	7
Wethers, C.B.	0	14	3
Ewes, C.B.	0	13	5
Lambs	0	13	1
Porkers	1	5	0
Slips	0	8	6

Orchard Notes for February.

BY ALBERT H. BENSON.

DURING this month there is no great output of Queensland-grown fruit, though there will still be a few pines and mangoes to market on the coast and grapes from the Downs and Roma districts also, as well as European plums, pears, apples, quinces, peaches, &c., from the Downs, especially the Stanthorpe district. Growers should take every care to send nothing to market unless it is sound, as diseased fruit is unsaleable, and its presence prevents the sale of sound local fruit. Large plums, such as the Yellow Magnum Bonum and Pond's Seedling, which do well in the colder districts, will pay for extra care in handling and packing, and the same applies to good peaches or pears. The plums should be carefully packed in shallow boxes, but the peaches should be wrapped in tissue paper and packed in single layers in trays fitting into well-ventilated crates, so that they can reach the market with the bloom on and without being bruised. For sound fruit in this condition there is a good sale, and it will pay growers to put such fruit on the market in the best manner possible. Chip baskets holding about 5 lb., and fitting into crates, are also excellent for marketing high-class plums or firm-fleshed peaches, but soft-fleshed peaches that bruise readily are best wrapped and packed in single layers in trays.

As the month is usually a more or less wet one, the cultivation of the Orchard is apt to become somewhat neglected, owing to the impossibility of getting horses on to the land and to the rapid growth made by weeds of all kinds.

However, when the land is dry enough, cultivators fitted with surface knives should be used to cut down the weeds, and when such are too strong to be treated in this manner they should be mown down before they mature their seeds, and the trash buried by a shallow ploughing. In the drier districts, however, the cultivator should be kept going to retain the moisture in the land, especially after a rain, when the sooner the surface can be stirred after the rain stops the more moisture will be retained. Where needing it, citrus trees should receive an irrigation during the month—not a mere sprinkling, but a thorough soaking—as it is much better to give the trees a good watering and to be done with it than to be continually applying small quantities. Surface waterings induce the growth of surface roots, and this is a drawback in hot, dry districts.

Scale insects of all sorts attacking citrus or other evergreen trees should be systematically fought during the month by spraying or fumigation; and where spraying is used, it is advisable to use a poisonous spray that will destroy scale and leaf-eating insects at the same time.

The planting out of all tropical and semi-tropical fruits can be continued throughout the month during suitable weather—viz., dull or showery days. Mango seeds should be planted either in nursery or, where possible, where the tree is to be permanently located. Plant the seeds as soon as they are taken from the fruit, as if exposed to the air they rapidly dry out and lose their vitality. Don't plant seeds of any mangoes unless they are of extra quality and good bearers. There is far too much rubbish propagated for which there is no sale now; so if we don't want to increase this, only selected seeds of the best varieties should be planted.

Budding can be continued during the month, and the nursery will require constant care to keep it free from weeds, to see that all ties are cut, and, where necessary, that the buds are properly started and tied up, as, unless the young tree is properly started and trained to a single straight stem in the nursery, the grower has a difficult job to get it to grow into a decent tree when it is permanently planted out.

First plantings of strawberries for the production of early fruit can be made during the month. The land should be a rich loam, deeply worked and carefully prepared, and, where the same is available, should receive a good dressing of well-rotted farmyard manure, or, if this is not obtainable, then a dressing of 6 to 8 cwt. per acre of a mixture of Thomas' phosphate or superphosphate of lime or bones and sulphate of potash, in the proportion of 5 cwt. of phosphate to 1 cwt. of sulphate of potash. If possible, choose a piece of land that can be watered, and that is as free from frost as possible, as, if the winter and spring are dry, a supply of water for irrigation will be of the greatest assistance; and freedom from frost will secure early fruit. Obtain healthy runners, not old plants split up; and where the strawberry leaf blight is prevalent, remove and burn all old leaves on the runner, and dip the crown and remaining leaves, but not the roots, into Bordeaux Mixture to destroy the spores of the fungus causing this disease; and thus obtain healthy young plants to start with. Set the plants out in rows 3 feet apart and 1 foot apart in the row where the plot is to be worked by horse power, but where the labour is by hand 2 feet between the rows is sufficient. If the strawberries are to be irrigated, then the land must be graded level, and should be laid off in double rows, there being 4 feet between each double row, and 2 feet between the rows forming the double row.

The plants should be set on a slight ridge formed from the centre of the double row, which is thus lower than the plants, and forms a channel along which the water runs, and irrigates the plants on both sides of it.

The following are some of the best varieties of strawberries to plant:—Marguerite, Trollope's Victoria, and Pink's Prolific. Marguerite is early, and does well in fairly light loams, but is very subject to the leaf blight; still on account of its size and productiveness it pays to grow it, and keep it free from disease. Pink's Prolific is a very healthy, high-coloured, showy fruit-good bearer in rich volcanic loams. Trollope's Victoria requires a rich heavy loam to produce the best fruit, and when grown in such a soil it is a good bearer of large showy fruit. There are other varieties, such as the Captain, Edith, and Sharples, that are worth testing, and some varieties of local origin that may turn out to be of considerable value for our climate, but until such are fully tested it is better to stick to the three first-named sorts when planting on a large or fairly large scale.

Farm and Garden Notes for February.

Farm Notes.—During this month plough up and prepare the land for a potato crop. Small seed potatoes are best for March planting, as the larger potatoes require to be cut, and the sets are liable to rot in the ground. Deep ploughing is recommended. Those who have a rich deep soil, in fine tilth, clear of weeds, will do well to sow lucerne; but if the weeds are still making their appearance in consequence of the present close, muggy, showery weather, then it is better to defer the sowing until the ground is perfectly clear. If seed potatoes are becoming wormy in the pit owing to dry weather, they should at once be sorted out and planted. Maize may still be sown on the coast, but except in favourable situations it will run the risk of being damaged, should frosts appear in June. Early potatoes may be planted. Where the soil is poor, bone-dust or short manure should be used. For an early winter crop, sow Swede turnips and mangelwurzel. Under conditions of well-prepared, clean ground, sow panicum, Cape barley, sorghum, vetches, Kafir corn, and imphee.

Kitchen Garden.—Dig or plough up roughly all unoccupied ground, and if necessary add well-decomposed manure. Such land as is not required for immediate use will benefit by exposure, and what has been fully prepared will be ready for sowing at the first convenient moment. Many market gardeners will have cabbages and cauliflowers ready for transplanting. This should be done during the month; but a lookout will have to be kept for the fly, which will be troublesome probably. Some consider that it is well to defer sowing cabbages and cauliflowers until March; and for the warm coast lands it is not quite safe to sow until then.

If the aphis appears, a sprinkling of tobacco solution will have a good effect in banishing them. The slug is also now much in evidence, and is very destructive. A sprinkling of tobacco powder, the refuse of the tobacco factories, will effectually put an end to this pest. Sow French beans, butter beans, beet, carrot, turnip, radish, cabbage, cauliflower, cress, peas, mustard. Former sowings should be kept clear of weeds. Mulch round melon and cucumber beds with a good dressing of long stable manure, as this assists in keeping the fruit clean and free from dampness. Should the weather be very dry after the last rains in January, and the plants appear to suffer, give them a good soaking of water. Less than soaking is useless at this time of the year, when the plants are exposed to the heat of the sun. It is better to depend entirely on mulching than to give a mere sprinkling of water. Seeds of selected plants should be gathered as they ripen, or they become too brittle, and the pods shed the seed. Examine the cucumber, melon, French beans, butter beans, and tomatoes, and gather the fruit whether it is required for use or not; for if left on the vines or plants to perfect their seed, the plants will soon cease to be productive, or will form ill-shaped, inferior, unsaleable fruit.

Horticultural Notes.

By PHILIP MAC MAHON,
Curator, Botanic Gardens, Brisbane.

QUEENSLAND, perhaps more than any other country, combines in itself the climates of the tropical and temperate zones, and that not only in separate places, one more elevated than the other, but in one and the same place. A little time ago I took a man from Covent Garden market to see the pineapple gardens at Nundah, near Brisbane. He knew something of horticulture, being one of those on whom the special medal granted by the Queen for services rendered in horticulture during her reign had been granted. He expressed himself amazed at seeing the large plantations of pines growing so luxuriantly and bearing such magnificent fruits amid surroundings which even to him, a stranger, seemed to tell of a temperate climate. "If you could only pop this down in Covent Garden market," said he, and the grower wistfully echoed "If!"

This kinship to the temperate climate of England is one of the reasons why there is always a hankering after the "English" annuals and flowers, as they are called. As a matter of fact there is nothing English about them. Most of them had their origin in South Europe, California, Central and South America, India, Japan, China, and not a few in Australasia. They have been improved by selection and cross-fertilisation, so that if the ghost of a gardener of 50 years ago were to revisit the glimpses of the moon he would not recognise his old favourites in their new fashions. "Now, what annuals am I to sow in order to have my garden gay for the cool weather?" is a question which is very often asked here, and it is a question which, like many others, is easier to ask than

answer offhand; but, as there seems a real want for the information, I have made out a list of the plants, seeds of which may be sown when this falls into your hands, and have added a few words in each case of description, &c. The seeds which are generally sown at this time are procurable in such immense variety that a mere list of their names would be something to wade through. The following can be had in several varieties, and your better plan is to leave the selection to your seedsman:—Amaranthus, antirrhinum, aster, balsam, calliopsis (Coreopsis), campanula, carnation, centaurea, cockscomb, convolvulus, chrysanthemum, dianthus, everlastings, gaillardia, gomphrena, godetia, grasses (ornamental), helichrysium, iberis (candytuft), ipomæa, larkspur, lobelia, lupinus (lupins), marigold, mignonette, mimulus, myosotis (forget-me-not), nasturtium, nemophila, pansy, penstemon, phlox, portulaca, poppy, primula, salpioglossus, salvia, solanum, statice, stocks, sweet peas, sweet william, wallflower, zinnia. It is easy to get from 6 to 30 varieties of any of the above. You have only to make up your mind how much money you want to spend on seeds, indicate to your seedsman the sorts of the above you would like, and he will send you a collection which will in all probability be better than any you could select for yourself. The Value Payable Post system, recently introduced by the Post Office authorities, affords a ready means of getting seeds, since you need not trouble about post office orders and the like. You simply send your order by postcard or letter, and pay the postman when he brings the parcel. The seedsman does the rest.

The plants in the following list are numbered; this will be handy for ordering. You can order by number only, and refer your seedsman to this list; or you can number your seeds as you sow them, and avoid all the bother of labelling:—

1. Abronia villosa. Sweet-scented annual; rockwork.
2. Acanthus mollis. Perennial foliage plant.
3. Acroclinum roseum, A. album. Everlastings, beautiful; cut before ripe and dry.
4. Adonis autumnalis (Pheasant's Eye). Brilliant and pretty; red.
5. Agrostemma cœli rosea (Rose of Heaven). Pretty annual; any soil.
6. Amaranthus bicolor, A. Henderi, A. tricolor, A. tricolor hybridus. Beautiful foliage plants; should be grown by all; grand to light up dark foliage.
7. Ammobium alatum (Everlasting). White.
8. Amblyolepis setigera. Bright yellow; delightfully scented.
9. Anchusa capensis (Cape Forget-me-not). Blue.
10. Anagallis grandiflora. Light blue.
11. Anemone coronaria (Wind Flower). Perennial, very pretty; sow in a pan.
12. Antirrhinum magus (Snap Dragon). Very good in Queensland.
13. " magus, Tom Thumb. Very dwarfy; get a mixed packet.
14. Armeria maritima (Sea Pink, Thrift). Very pretty; good for borders.
15. Aster, Victoria. There are many varieties, all good.
16. Atriplex hortensis purpurea (Orach). Good hardy foliage plant.
17. Balsam, Victoria. Usually grown as summer plants, but will do now; make nice pot plants if well fed.
18. Bartonia aurea. Beautiful golden colour.
19. Begonia, Tuberous Rooted. Several species, all good; sow in a pan, prick off when fit to handle.
20. Bellis perennis, double; B. perennis maxima (Double Daisies). These make beautiful edgings and flower most freely; they succeed splendidly here.
21. Beta brasiliensis (Ornamental Beet). Very ornamental in large gardens.
22. Brachycome iberidifolia (Swan River Daisy). Stands heat well; a pretty dwarf annual.
23. Browallia Rœzlii. A general favourite, blue and white.
24. Cacalia coccinea (Tassel Flower). Scarlet flowered annual, pretty.
25. Callichroa Douglasii. Yellow, very pretty.
26. Calendula imbricata (Marigold). Various varieties, some, like Orange King; very fine.
27. Calliopsis Atkinsonii
28. " Drommondii
29. " lanceolata
30. " philadelphica

The correct name is Coreopsis, but the annual species and varieties have come to be called Calliopsis. They are amongst the best and showiest annuals, all shades of yellow and maroon.

31. Callirhoe involucrata. A most beautiful deep-purple flower; trailer.
32. Campanula medium (Bell Flower). There is an immense variety, all han some annuals or perennials; some, as C. Garganica, are trailers. Get a mixed pack
33. Capsicum. Every garden should have some of these; the fruits of some a beautiful.
34. Carnation Margaritæ (Margaret Carnations). Very useful for cut flowers
35. „ perpetual flowered (Tree Carnations). A packet of seed gi mixed colours.
36. Carnation, Uriah Pike. Crimson velvet; a fine flower.
37. Celosia cristata (Cockscomb). Some of the varieties are very beautiful, li large masses of brilliantly coloured velvet.
38. Celosia pyramidales (Fire Feather). Very striking.
39. Centaurea candidissima (Centuary). A silver-leaved perennial; useful f bouquets, &c.
40. Centaurea Cyanus (Cornflower). Beautiful blue; a general favourite.
41. „ suaveolens. Yellow, scented.
42. Cerinthe major (Honeywort). A good bee flower, not showy.
43. Chelone barbata. A handsome plant like a Pentstemon.
44. Chenopodium atriplicus (Goosefoot). In dry places the foliage is beautifu tinted.
45. Chrysanthemum coronarium (Crown Daisy). Fine for borders.
46. „ frutescens. Yellow; very fine.
47. „ indicum. Several splendid varieties of this.
48. „ leucanthemum (Ox-eye Daisy). White; very large, go for decoration.
49. Chrysanthemum maximum (Moon Penny Daisy). Large, pure white decorative.
50. Chrysanthemum Myconis. Flowering early.
51. „ tricolor. In several varieties; very beautiful.
52. Cineraria hybrida. Bushhouse favourite; grows outside with shade fro midday sun.
53. Clianthus Dampierii (Sturt's Desert Pea). One of the handsomest plants i cultivation; a biennial.
54. Clianthus punecius (Glory Flower). Splendid against a fence; brig scarlet.
55. Clarkia elegans } Of these two species there are several varieties; all pre
56. „ pulchella } and popular annuals.
57. Clintonia pulchella. Blue and white; pretty.
58. Clitoria Ternatea. Showy and well-known climber, with blue pea-shap flowers; there is a white variety.
59. Coleus hybridus. Handsome foliage plants; varieties cannot be perpetuate by seed, but a packet is sure to produce many distinct colours, and it is interesti work raising them.
60. Cobœa scandens. A rambling climber; likes a rather shady place; there a pretty variegated variety.
61. Collinsia bicolor, C. multicolor. Hardy and useful annuals; purple an white.
62. Collomia coccinea. Scarlet; showy.
63. Convolvulus major, fl. pl. Double-flowered, trailing; mixed colours.
54. „ mauritanicus. Very distinct; blue and white.
65. „ minor. Dwarf; get a mixed packet.
66. Cosmos bipinnata. There are several varieties; they form the most useful garden flowers. "Klondyke," a bright golden yellow, is a magnificent flower. strain of Californian hybrids comprises some beautiful varieties. You should certain have a large packet of these.
67. Cosmos sulphureus. Bright yellow; good for decoration.
68. Dahlia gracilis. A single dahlia; bright red; good.
69. „ Jaurezi. Bright, showy; semi-double; makes a grand mass.
70. Delphinium cashmerianum, D. Hendersonii. These and one or two oth species should find places in every garden.
71. Didymocarpus Gardneriana. Pretty lilac flower; good for edges in rockery
72. Digitalis monstrosa (Foxglove). Does not do well in Queensland; might tried in a position which keeps damp and semi-shaded.
73. Dianthus Heddewigii, D. laciniatus. The varieties of these are indispensa in any garden.
74. Eccremocarpus scaber. One of the prettiest of creepers; orange and red.

75. Echium candicans (Viper's Bugloss). Blue; biennial plant.
76. Erysimum Perofskianium. Bright orange; showy.
77. Eschscholtzia californica. Very showy; Mandarin is a good variety.
78. Euchardium grandiflorum. A rosy-red dwarf annual.
79. Exacum affine. Dwarf; violet colour; charmingly scented.
80. Fedia cornucopiæ floribunda. Very pretty, purple.
81. Ferdinandia eminens. Good for effect in a large garden.
82. Gaillardia amblyodon.
83. „ grandiflora.
84. „ grandiflora, Miss Powell
85. „ grandiflora picta.
86. „ grandiflora Richardsonii.

All the Gaillardias are indispensable. The colours are most brilliant, the plants hardy, easily raised, most floriferous, and the flowers last well when cut.

87. Gloxinia hybrida. These gorgeous flowers are easily raised; sow on surface of pot, put a pane of glass over, keep damp; prick off soon; use light soil and leaf-mould.
88. Gazania nivea. Showy perennial yellow.
89. Gazanopsis stenophylla. Showy, for dry places.
90. Geum coccineum. Crimson; fine plant.
91. Gilia tricolor. Pretty annual; sow where it is to flower.
92. Godetia Whitneyi. There are several varieties of this, all good.
93. Gomphrena Haageana (Globe Amaranth). Bright orange, showy.
94. Helianthus annuus (Sunflower). Very fine for groups in a large garden, but out of place in a small one. There are several varieties, as Globe of Gold, Henry Wilde, Miniature, Texas, Silver Queen, improvements on the type.
95. Humea elegans (Plume Flower). Very elegant and useful for vases, &c.
96. Heliotropium peruvianum (Heliotrope). This plant can be had in many improved varieties, such as Adele, Madame Jubbinger, Miss Nightingale, White Lady, &c. They make most useful plants for the garden and for cut blooms.
97. Hesperis matronalis (Sweet Rocket). Old favourites, highly perfumed; there are red, blue, and white.
98. Iberis amara (Candytuft)
99. „ coronaria (Rocket Candytuft)
100. „ odorata (Sweet Candytuft)
101. „ sempervirens

There are many nurserymen's varieties of the Candytufts, Dobbie's White Spiral being one of the best. They should be largely sown, as they are most useful.

102. Impatiens glandulifera. Perennial, with rose flowers.
103. „ Sultanii. This pretty plant is easily raised from seed. It prefers a shady position.
104. Ipomopsis elegans. Orange; graceful.
105. „ elegans superba. Scarlet; very showy.
106. Ipomæa coccinea. Very beautiful.
107. „ rubra cœrulea. Charming blue; fine flower.
108. „ sinuata (Noonday Glory). One of the most lovely and free-growing of creepers.
109. Kaulfussia amelloides. Dwarf and free flowering.
110. Lathyrus odoratus (Sweet Pea). The varieties of this favourite climber are too numerous to mention. They are of all colours, and all beautiful and sweet-scented. Perhaps most amateurs will be satisfied with a mixed packet.
111. Layia elegans. A Californian yellow and white annual.
112. Linaria bipartita. A pretty annual, purple colour.
113. „ cymbalaria (Kentucky Ivy). Very pretty, small trailer, not showy.
114. „ Hendersonii. Violet in colour.
115. Limnanthes Douglasii. Very effective, yellow and white.
116. Linum grandiflorum. Brilliant red.
117. „ grandiflorum roseum. Rose colour.
118. Lobelia erinus. There are numerous varieties, more or less distinct, but they must be got true from cuttings. Good seeds, however, give dwarf compact plants. If carefully raised and not "drawn" in the seed beds, they form a charming object in the flower garden. They did well here last year. They like leafmould and moisture.
119. Lupinus Hartwigii (Lupin). Various colours; good for masses.
120. Lychnis Haageana. Deep scarlet, fine.
121. Malope grandiflora. White rose and red varieties.
122. Mandevillea suaveolens. Deliciously scented; may be sown in a pot.
123. Marigold. African, Eldorada, and French are the best varieties of the numerous garden hybrids; indispensable.
124. Martynia fragrans. Like a small Gloxinia.

125. Mimulus cardinalis (Monkey Flower) } Beautiful dwarf plants, well worth growing; yellow spotted and streaked with red.
126. „ tigrinus }

127. Myosotis dissitiflora (Forget-me-not). Charming blue; dwarf.

128. „ rupicola. Deep blue; somewhat taller.

129. Nasturtium Lobbianum (Indian Cress). Several varieties: "Ball of Fire," "Crown Prince," &c.

130. Nasturtium Lobbianum (Tom Thumb). A series of dwarf bedding varieties: very good.

131. Nemesia strumosa. Delightful annual.

132. Nemophila insigns. Blue; very pretty.

133. Nicotiana affinis (Scented tobacco). Pure white; charmingly scented.

134. „ decurrens. Dwarf; scented.

135. Nigella hespanica (Love-in-a-mist). An old favourite; pale-blue.

136. Œnothera chrysantha (Evening Primrose). Yellow.

137. „ rosea mexicana. Rose.

138. Pansy (Viola tricolor). The varieties are legion. A mixed packet of a good strain, such as "Henderson's Mammoth Butterfly," will suffice for ordinary needs. Put plenty of leafmould with the compost both for sowing and pricking off. This facilitates lifting.

139. Papaver Danebrog (Poppy) } Brilliant garden flowers, greatly improved of recent years, liable to damp off if allowed to remain in the seed pans.
140. „ Hookerii
141. „ Pæony flowered
142. „ Shirley }

143. Pentstemon Hartwigii. Perennial, easily raised from seeds.

145. Perilla nankinensis. A tall, almost black-leaved annual.

146. Phacelia campanularia. Blue, pretty.

147. Phaseolus caracalla (Snail Flower). A perennial climber, delightfully scented, and very curious and beautiful.

148. Physalis Alkekengi (Lantern Flower). A curious plant, with coloured bladder-like envelope around the fruit.

149. Portulaca plenissima. A low-growing plant with double brilliant flowers, suitable for rockeries or dry places.

150. Phlox Drummondii. There are many varieties; cuspidata and nana compacta are recommended. These beautiful flowers should have a prominent place in every collection of annuals.

151. Primula chinensis (Chinese Primrose). Sow in a pan with good drainage; place in a shaded frame, covered with glass; when up, prick off into another pan 2 inches apart, and afterwards put into pots of 3, 4, and 6 inches diameter. Soil for potting—4 shovels loam, 1 leafmould, 1 fine sand, 1 well-rotted cow-manure.

152. Pyrethum parthenofolium aureum (Golden Feather). A well-known edging plant. Sow in boxes; prick off and plant out when 1½ to 2 inches high.

153. Reseda odorata (Mignonette). The varieties are numerous and a great improvement on the old garden favourite. Covent Garden Favourite, Crimson Queen, Garaway's White, Giant Pyramidal, Mile's Hybrid, Queen Victoria are recommended. If you have time at your disposal you can train some of the tree varieties – such as Parson's Tree—into handsome pyramids. It is good to sow common mignonette anywhere about your borders, and let it come up at its own sweet will.

154. Romneya Coulterii (Californian Poppy). A very beautiful perennial, which is worth taking some trouble with; has a very delicate perfume.

154A. Salvia Rœmeriana (Crimson Sage). This is a very beautiful species; there are several others (over 400), many of which are very fine.

155. Salpiglossis variabilis. Get a mixed packet; there are several colours; the later varieties are singularly beautiful.

156. Saponaria ocymoides. A very pretty dwarf annual; best when grown in masses.

157. Schizopetalon Walkerii. Beautiful and curious; scented; white.

158. Schysanthus pinnatus } Very beautiful; make good pot plants with care.
159. „ retusus }

160. Senecio elegans plenissima (Double Groundsel). These beautiful plants made a huge bed here last year, which was the admiration of everyone. There are several colours. They require a damp soil. They grow about 18 inches high, and are perfect flowers to cut; they last so well.

161. Seline pendula (Catchfly). Zulu king is a double rose variety, very suitable for edgings.

162. Sphenogyne speciosa. A very showy orange-coloured annual.

163. Statice superba. Showy.
164. „ Suworowi. Beautiful rose colour.
165. Stocks (Mathiola). There are many varieties of the ten-weeks stock (Mathiola annua); East Lothian, Emperor, and Brompton stocks, too, are found in several varieties. Any good seedsman will choose you two or three packets of the best varieties; New Giant, Victoria, and wallflower-leaved are good.
167. Tagetes, Queen of Dwarfs. Makes a lovely edging.
168. Torrenia asiatica } Very pretty little annuals; make most lovely baskets
169. „ Fournieri } for bush-house or veranda.
170. Tropaeolum canariense. A beautiful yellow-flowered climbing annual.
171. Viscaria aculeata. Makes an effective mass, of little use singly. Sow where they are to flower.
172. Xeranthemum annuum. The double varieties are very effective everlastings.
173. Zea gracillima variegata (Variegated Maize). Very effective and easily grown.
174. Zinnia elegans, Z. Haageana, Z. tagetiflora. Amongst the very best annuals. They are excellent for flowering during our hot summer months, but they can be had almost the whole year round. There is an endless variety of colour. Some of the varieties, like Tom Thumb, are dwarf, and a packet of this should be got for planting around the taller varieties.

Ornamental Grasses.—Every garden should have a small collection of these. They make such charming bouquets when fresh, and when dried are so good to mix with everlasting flowers. A few of the best are:—Avena sterilis, animated oats; Briza compacta, B. lutescens, B. maxima, B. minima; Quaking grasses, very graceful and pretty for bouquets; Bromus brizæformis; B. patulus, grand for use amongst dried flowers; Chloropsis Blanchardiana; Coix lachryma, Job's tears; Eragrostis elegans, Love-grass; Erianthus Ravennæ; Festuca rigida; Hordeum Jubatum; Lagurus ovatus; Melica papilionacea; Panicum plicatum, and its varieties maximum and variegatum; Pennisetum longistylum, a very beautiful grass, splendid for vases, &c.; Stipa pinnata, Feather-grass; Uniola latifolia; Vulpia bromoides.

Ornamental Gourds—such as Coccinia indica, Cucumis anguria, Cucurbita melanosperma, Cyclanthera explodens, Lagenaria gigantea (great bottle gourd), L. pyrotheca (gunpowder-flask gourd), Luffa acutangula, L. macrocarpa, L. Soolya Qua (China giant cucumber), Momordica Charantia (very showy and curious), Playgonia Kæmpferi, Tricosanthes anguina (snake-gourd)—will be found to add interest and variety to your garden.

The above will, I fancy, be found to yield sufficient variety for the most exacting of gardeners in Queensland, but it is by no means a very exhaustive list, and some plants which are regarded as prime favourites are not included because for some reason they cannot be recommended for our climate.

Turn up every square yard of land which you propose to utilise during the coming cool weather. If you have kept the hoe busy, you will not have so much trouble with weeds. The ground will be found very friable for digging if you do not tackle it immediately after heavy rain. You will find it better not to go on to tenacious land at all immediately after rain. But you must not let weeds seed, and you must see that your land is liberally treated with manure. You can no more expect land to yield you constant crops without suitable manure than you can expect your cow to yield you milk regularly without food. Go in for horse cultivation in your kitchen garden as freely as you can. A pony and a small plough and scarifier will do wonders in a garden. Do not neglect the hand plough. If you simply want to put in so many hours every day this is a tool to let rust; but if you want to do some real work, and justify your existence, you will keep it very bright from constant use.

Dig in the manure as you take it from the pit where it has been soaked with the liquid which has drained from it. The earth has a wonderful affinity for the gases given up by manure; it soaks them up and stores them for the use of the hungry and thirsty plants. Everything that comes from the land, and not actually turned into flesh and bone, should be returned to the land as a manure. Your garden is a little world. All the laws regulating the big world are at work within it, and you are the ruling genius. You must keep up the rotation of use and replenishment, or ultimate poverty is the lot of your little empire.

Don't meddle too much with lawns while wet, but when you get a chance between rains roll and top dress them if they want it.

Keep planting out palms and all plants which make roots and leaves simultaneously. All tropical evergreens do best in showery, hot weather. We are likely here to have spells of quite scorching weather between rainy, muggy spells. Such plants suffer then severely, and any temporary shade will help them very much.

You can bud all sorts of plants now, such as roses, &c. You can also layer all plants (and their name is legion) which do best in this way. Geraniums strike readily from cuttings now, and, if put in where they are intended to remain permanently, will be found to give very little trouble for after attention. Look after the tieing of your dahlias, also after the ties on your young trees which will now be rapidly swelling, and likely to cut if the ties are not attended to.

Bush-house.—Look after this, and overhaul, prune, plant, and topdress. You will find many plants just a little greedy, and likely to overrun their more modest and more worthy neighbours. Cut them without compunction; they are built to stand it. Dry off caladiums and similar plants. All bush-house plants will now appreciate watering with liquid manure. It is always best to water in the evening if you can so arrange it, and after watering with liquid manure give a brisk syringing to wash off any possible dirt from the manure, or, at any rate, the impalpable particles which are always floating in the air, and which, though invisible to the naked eye, are always settling on the surfaces of plants, choking up the breathing pores. Plants like to have their faces cleaned, no less than their owners.

Vegetable Garden.—This is a busy month. You may sow beans, beets, brocoli, Brussel's sprouts, cabbage, carrot, egg plant, endive, eschalots, herbs, lettuce, maize, sweet peas, radish, salsify, savoys, spinach, tomato, turnips. Seeds sown last month will want attention—such as thinning, planting out, watering, weeding, &c. Be most careful that the growth of your young vegetable plants be not checked. They may seem to recover, but their cells become as it were "set," and, like a human being whose mental or physical powers have been arrested in youth, the effects remain. Throw away all stunted seedlings. Do not make the present sowing your main one unless you are in a cool climate. March is the big sowing month. If you sow in boxes, have them ready; and, if possible, have your compost under cover, so that when a pouring wet day comes you can comfortably withdraw under cover, and, while the elements are working for you outside, be busy at work within.

Let your warcry with weeds be, "Slay and spare not." Every stray outpost of the enemy routed before its members can seed is a battalion destroyed for next year.

Public Announcements.

The Editor will be glad to receive any papers of special merit which may be read at meetings of Agricultural and Pastoral Associations in Queensland, reserving, however, the right to decide whether their value and importance will justify their publication.

The *Queensland Agricultural Journal* will be supplied to all members of Agricultural and Horticultural Societies who do not derive their livelihood solely from the land, on payment, in advance, of an annual subscription of 5s.

LIST OF AGRICULTURAL, HORTICULTURAL, AND PASTORAL SOCIETIES AND ASSOCIATIONS IN QUEENSLAND.

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Allora ...	Central Downs Agricultural and Horticultural Association	J. H. Buxton... ...	
Avondale ...	Avondale Farmers' and Planters' Association	N. J. Mikkelsen ...	
Ayr	Lower Burdekin Farmers' Association ...	Winsor H. Wilmington	
Beaudesert ...	Logan and Albert Pastoral and Agricultural Society	M. Hinchcliffe ...	23 June
Beenleigh ...	Agricultural and Pastoral Society of Southern Queensland	Wilson Holliday ...	14 April
Biggenden ...	Biggenden Farmers' Association	Charles H. Peppin ...	14 June
Birthamba ...	South Kolan Agricultural and General Progress Association	G. W. Nixon ...	
Blackall ...	Barcoo Pastoral Society	F. Clewett	
Boonah ...	Fassifern and Dugandan Agricultural and Pastoral Association	J. A. McBean ...	18 and 19 May
Bowen ...	Pastoral, Agricultural, and Mining Society ...	J. E. Smith	17 Aug.
Bowen ...	Preston Farmers' Association, Lower Proserpine	G. Archer	
Bowen ...	Proserpine Farmers' and Settlers' Association	G. W. Pott	
Booyal ...	Booyal Farmers' Progress Association ...	Thos. Skillington ...	
Brisbane ...	Horticultural Society of Queensland	J. F. Bailey	19 and 20 April
Brisbane ...	Moreton Agricultural, Horticultural, and Industrial Association	J. Duffield	
Brisbane ...	Queensland Acclimatisation Society	E. Grimley	
Brisbane ..	Queensland Fruit and Economic Plant Growers' Association	G. K. Seabrook ...	
Brisbane ...	National Agricultural and Industrial Association of Queensland	H. C. Wood	10, 11, and 12 Aug.
Brisbane ...	Queensland Stockbreeders' and Graziers' Association	F. A. Blackman ..	
Brisbane ...	United Pastoralists' Association	Fredk. Ranson ...	
Bundaberg ...	Bundaberg Horticultural and Industrial Society	H. E. Ashley... ...	
Bundaberg ...	Council of Agriculture	S. A. Lindeman ...	
Bundaberg ...	Woongarra Canegrowers' and Farmers' Association	W. H. Dart	
Burpengary...	Burpengary Farmers' Association	C. H. Ham	
Byrnestown...	Byrnestown Farmers' Progress Association ...	J. Dufficy	
Caboolture ...	Caboolture Farmers' Association	G. Mallet	
Cairns ...	Aloombah Farmers' Association	Chas. R. Spencer ...	
Cairns ...	Cairns Agricultural, Pastoral, and Mining Association	A. J. Draper... ...	28 and 29 Sept.
Cairns ...	Cairns District Coffee Growers' Association...	W. A. Hannam ...	
Cairns ...	Cairns District United Farmers' Association	Wm. Griffin ...	
Charleville ..	Hambledon Planters' Association	E. Whitehouse ...	
	Central Warrego Pastoral and Agricultural Association	A. J. Carter	25 and 26 May

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Charters Towers	Towers Pastoral, Agricultural, and Mining Association	W. Tilley	
Childers ...	Isis Agricultural Association	H. Epps	
Childers ...	Childers Progress Branch, Isis Agricultural Association	N. Rosenlund ...	
Childers ...	Doolbi Mill Branch, Isis Agricultural Association	W. T. H. Job ...	
Childers ...	Childers Mill Branch, Isis Agricultural Association	H. Epps	
Clermont ...	Peak Downs Pastoral, Horticultural, and Agricultural Society	F. Leysley	
Clermont ...	Peak Downs Dairymen and Settlers' Association	A. G. Pursell ...	
Cooktown ...	Cook District Pastoral and Agricultural Society	W. R. Humphreys ...	
Cooran ...	Cooran Progress and Agricultural Association	Thos. Smith	
Cordalba ...	Cordalba Farmers' Association	B. Goodliffe	
Currajong ...	Currajong Farmers' Progress Association ...	Wm. Howard ...	
Cunnamulla	South Warrego Pastoral Association	J. Winward	
Deception Bay	Deception Bay Farmers' Association	B. J. T. Liscombe ...	
Degilbo ...	Degilbo Farmers' Association	F. A. Griffiths ...	22 and 23 June
Gayndah ...	Gayndah Agricultural and Horticultural Association	J. C. Kerr	
Gin Gin ...	Pastoral and Agricultural Society of Gin Gin	E. K. Wollen ...	
Gladstone ...	Gladstone Pastoral and Agricultural Association	W. J. Manning ...	
Gooburrum, Bundaberg	Gooburrum Farmers' and Canegrowers' Association	W. J. Tutin	
Goondiwindi	MacIntyre River Pastoral and Agricultural Society	A. Gough	
Gympie ...	Agricultural, Mining, and Pastoral Society	F. Vaughan	13 and 14 Sept.
Gympie ...	Chatsworth Farmers' Progress Association ...	William Bellman ...	
Gympie ...	Deep Creek Farmers' Progress Association ...	W. Reid	
Gympie ...	Gympie Horticultural Society	Charles Brasch ...	19 and 20 April
Gympie ...	The Pie and Eel Creek Farmers' Association	D. J. O'Farrell ...	
Gympie ...	Gympie Central Farmers' and Progress Association	J. Howard Maynard	
Haslemore, Victoria, Herbert Riv.	Herbert River Farmers' League	Alfred Henry ...	
Helidon ...	Helidon Scrub Farmers' Progress Association	M. Morgan	
Herbert River	Halifax Planters' Club	H. G. Faithful ...	
Herbert River	Macnade Farmers' Association...	E. C. Biggs	
Herbert River	Ripple Creek Farmers' Association	J. W. Grimes ...	
Herberton ...	Mining, Pastoral, and Agricultural Association	John M. Hollway ...	3 and 4 April
Hodgson ...	Hodgson Farmers' Association	C. W. Nimmo ...	
Hughenden ...	Hughenden Pastoral and Agricultural Association	W. H. Mulligan ...	8 and 9 May
Ingham ...	Herbert River Farmers' Association	...	
Ingham ...	Herbert River Pastoral and Agricultural Association	P. J. Cochrane ...	15 and 16 Aug.
Ipswich ...	Ipswich and West Moreton Agricultural and Horticultural Society	P. W. Cameron ...	21 Sept.
Ipswich ...	Queensland Pastoral and Agricultural Society	Elias Harding ...	1 and 2 June
Kandanga (near Gympie)	Kandanga Farmers' Association	N. Rasmussen ...	
Kolan ...	Kolan Canegrowers' and Farmers' Association	C. Marks	
Ladeside ...	Mungore Farmers' Association...	J. M. Robinson ...	
Laidley ...	Lockyer Agricultural and Industrial Society	John Fielding ...	26 and 27 July
Loganholme...	Logan Farming and Industrial Association ...	F. W. Peek	
Longreach ...	Longreach Pastoral and Agricultural Society	J. P. Peterson ...	12 April
Lucinda Point	Victoria Farmers' Association	W. S. C. Warren ...	
Mackay ...	Agricultural, Pastoral, and Mining Association	F. Black	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Mackay ...	Pioneer River Farmers' Association	E. Swayne	28 and 29 June
Mapleton, *via* Nambour	Mapleton and Dulong Fruitgrowers' and Farmers' Progress Association	W. J. Smith	
Maryborough	Maryborough Horticultural Society	H. A. Jones	
Maryborough	The Island Farmers' Progress Association ...	C. A. Schmidt ...	
Maryborough	Wide Bay and Burnett Pastoral and Agricultural Society	G. Willey	4, 5, and 6 July
Miallo	Miallo Progress Association	E. F. Welchman ...	
Milbong ...	Milbong Farmers' Association	T. R. Garrick ...	
Mitchell ...	Mitchell and Maranoa Pastoral, Agricultural, and Vinegrowers' Association	H. J. Corbett ...	
Mosman River	Mosman River Farmers' Association	Geo. W. Muntz ...	
Mount Mee...	Mount Mee Farmers' Association	R. Thomas	
Mount Morgan	Mount Morgan Mining, Agricultural, Poultry, Pastoral, and Horticultural Society	G. Orford	
Mount Morgan	Mount Morgan Agricultural, Pastoral, and Poultry Society	Thos. W. Walker ...	
Mundoo ...	Johnstone River Farmers' Association ...	J. McInnes	
Nerang ...	South Queensland and Border Pastoral and Agricultural Society	W. J. Browne ...	
North Isis ...	North Isis Canegrowers' Association	W. J. Young ...	
Pialba	Pialba Farmers' Association	J. B. Stephens ...	
Pickenjennie ...	Wallumbilla Selectors' League	George Dalziel ...	
Pickenjennie	Pickenjennie Branch, Wallumbilla Selectors' League	George Dalziel ...	
Pinbarren ...	Pinbarren Agricultural and Progress Association	H. Armitage, senr. ...	
Port Douglas	Pastoral, Agricultural, and Mining Association	W. H. Dorrat ...	
Razorback ...	The Razorback Fruitgrowers' Association ...	Ernest E. D'Alton ...	
Rockhampton	Central Queensland Farmers' and Selectors' Association	T. Whitely, Coowonga	
Rockhampton	Central Queensland Pastoral Employers Association	G. Mackay	
Rockhampton	Central Queensland Stockowners' Association	R. R. Dawbarn ...	
Rockhampton	Rockhampton Agricultural Society	R. R. Dawbarn ...	10 and 11 May
Roma ...	Western Queensland Pastoral and Agricultural Association	Angus McPherson ...	2 and 26 July
Roma	Yingerbay Farmers' Association	Alex. C. McIntyre ...	
Rosewood ...	Farmers' Club	P. H. Adams... ...	25 Aug.
Springsure ...	Queensland Pastoral Society	G. R. Milliken ...	
Stanthorpe ...	Border Pastoral, Agricultural, and Mining Society	Geo. Simcocks ...	22 and 23 Feb.
Stanthorpe ...	Stanthorpe Horticultural and Viticultural Society	R. Hoggan	
St. George ...	Balonne Pastoral and Agricultural Association	T. M. Cummings ...	
Tinana	Tinana Fruitgrowers' and Farmers' Association	Chas. Parke	
Toowoomba...	Darling Downs Horticultural Association ...	H. Hopkins	
Toowoomba...	Drayton and Toowoomba Agricultural and Horticultural Society	H. Symes	
Toowoomba...	Royal Agricultural Society of Queensland ...	F. Burtt	1, 2, and 3 Aug.
Townsville ...	Townsville Pastoral, Agricultural, and Industrial Association (formerly North Queensland Pastoral and Agricultural Association)	J. N. Parkes	
Wallumbilla	Wallumbilla Selectors' League	George Dalziel ..	
Warwick ...	Eastern Downs Horticultural and Agricultural Association	J. Selke	31 Jan. & 1 Feb.
Wellington Point	Wellington Point Agricultural, Horticultural, and Industrial Association	F. W. Wort	21 June
Woombye ...	Woombye Fruitgrowers' Association	P. S. Hungerford ...	
Woowoonga	Woowoonga Scrub Farmers' Association ...	H. B. Griffiths ...	
Zillmere ...	Zillmere Horticultural Society	C. McF. Fischer ...	20 Jan.

"THE DISEASES IN PLANTS ACT OF 1896."

Department of Agriculture,
Brisbane, 19th January, 1899.

HIS Excellency the Governor, with the advice of the Executive Council, and in pursuance of the provisions of "*The Diseases in Plants Act of* 1896," has been pleased to make the following further Regulations.

J. V. CHATAWAY.

THE FUMIGATION OF FRUIT FOR EXPORT.

1. Any one who wishes to erect a chamber or building for the fumigating of fruit is requested to give notice to the Under Secretary for Agriculture, who will take steps to see that the chamber or building is properly constructed.

2. When it is required to fumigate fruit for export, twenty-four hours' notice must be given to the said Under Secretary or such other officer as may be duly authorised to accept such notice.

3. The operation of fumigating must be conducted under the control of an officer authorised by the Minister for Agriculture.

4. The fumigating chamber may be made of any convenient size or material, the essential point being that it shall be capable of being closed absolutely airtight, and provided with a flue-pipe in the roof which can be opened or closed to allow of the escape of the gas after fumigation. The flue must be provided with a box or chamber to contain caustic soda or potash to destroy the gas.

The fumigating chamber must be provided with a shutter or sliding panel in the lower portion of the door or wall.

Door, flue, and shutter must all be made to close absolutely airtight.

DIRECTIONS FOR FUMIGATING WITH HYDROCYANIC ACID GAS.

Proportions of Ingredients.—For every 150 cubic feet of room take 1 ounce of cyanide of potassium, 5 fluid ounces sulphuric acid, 10 fluid ounces water.

Having placed the fruit to be fumigated in the chamber, see that the flue and the shutter in the door or lower part of all are properly closed.

The acid is then to be diluted in the following manner:—The whole of the water is placed in a shallow china or glazed earthenware vessel, such as an ordinary wash-hand basin. (Metal vessels are inadvisable unless they are leaden ones.) The sulphuric acid is next poured on to the water in a thin stream, stirring the while with a stick. Do not mix by adding the water to the acid.

The basin containing the acid thus diluted (which should be allowed to cool) is now placed in the fumigating chamber, and the cyanide of potassium is emptied into it.

The gas is given off with great violence, and the door should be immediately closed.

The whole is now to be left to itself for one hour. At the end of this time the shutters in the flue and in the door are opened, and the draught produced drives the gas out of the chamber. At the end of half an hour the door is thrown open, and if the draught has been effective there should be hardly any trace of hydrocyanic gas recognisable. The chamber may be left in this condition for another ten minutes or a quarter of an hour. The fruit is now to be moved and allowed to remain in a well ventilated place, preferably out of doors, for another half an hour. Samples of fruit will be examined from time to time by the entomologist.

Caution.—As hydrocyanic acid gas is most deadly in its effects on animal life, the greatest care must be taken in its use.

Department of Agriculture,
Brisbane, , 18

This is to certify that has treated cases of citrus fruit with hydrocyanic acid gas for one hour, under my supervision. These cases have been branded "Crown" over "Passed."

Shipping marks:
Per S.S.:
Consigned to:

Department of Agriculture,
Brisbane, 26th January, 1899.

THE following Proclamation by His Excellency the Governor of New South Wales is published for general information.

J. V. CHATAWAY.

NEW SOUTH WALES, to wit.
(L.S.)
HAMPDEN, *Governor.*

PROCLAMATION.

By His Excellency The Right Honourable HENRY ROBERT, VISCOUNT HAMPDEN, Governor and Commander-in-Chief of the Colony of New South Wales and its Dependencies.

WHEREAS the Governor is empowered by Section 9 of the "Vegetation Diseases Act, 1897," from time to time, by Proclamation in the *Gazette*, to declare any fungus or vegetable parasite whatever to be a fungus within the meaning of the said Act: Now, therefore, I, HENRY ROBERT, VISCOUNT HAMPDEN, the Governor aforesaid, with the advice of the Executive Council, do, by this my Proclamation, declare Black Spot (*Fusicladium*) to be a fungus within the meaning of the said Act.

Given under my Hand and Seal, at Government House, Sydney, this twenty-second day of December, in the year of our Lord one thousand eight hundred and ninety-eight, and in the sixty-second year of Her Majesty's reign.

By His Excellency's Command,

JOSEPH COOK.

GOD SAVE THE QUEEN!

Department of Agriculture,
Brisbane, 25th May, 1899.

HIS Excellency the Governor, with the advice of the Executive Council, has, in pursuance of the provisions of "*The Slaughtering Act of* 1898," been pleased to make the following Regulations.

J. V. CHATAWAY.

REGULATIONS UNDER "THE SLAUGHTERING ACT OF 1898."

Definitions.

1. Save as herein otherwise provided, in these Regulations the terms used have the meanings respectively assigned to them by "*The Slaughtering Act of* 1898."

The term "Stock" means and includes cattle, sheep, and swine;

The term "Licensing Court" means a Police Magistrate or if he is absent or there is no Police Magistrate, then any two justices sitting in a Court of Petty Sessions having jurisdiction in the district within which a slaughter-house is or is proposed to be established;

The term "Inspector" means the inspector (if any) to whom a district is assigned, or if he is absent, or there is no such inspector then any inspector appointed under the provisions of "*The Slaughtering Act of* 1898";

The term "Owner of stock" means the owner whether jointly or severally of the stock, or the authorised agent or superintendent of the owner, or the drover or person in charge of the stock.

Unlicensed slaughter-house.

2. Any person who establishes or keeps an unlicensed slaughter-house is guilty of an offence against these Regulations.

Illegal slaughter.

3. No person shall slaughter at any place other than at a licensed slaughter-house any stock the flesh of which is intended to be used for meat.

Licensing Court.

4. Subject to these Regulations, the Licensing Court may license slaughter-houses established or proposed to be established within a district.

Application.

5. Every person who desires to obtain a license or the renewal of a license for a slaughter-house shall make an application therefor in writing in the form in the First Schedule hereto or to the like effect.

Time for applying.

6. Every application shall be addressed to the Licensing Court of the district within which the slaughter-house is or is proposed to be established, shall be lodged with the proper Clerk of Petty Sessions, and shall be accompanied by the license fee hereinafter prescribed. Applications for licenses shall be so lodged on or before the fourteenth day of December, March, June, and September in each year. Applications for the renewal of licenses shall be so lodged on or before the fourteenth day of December in each year.

Duty of clerk of petty sessions.

7. Upon the receipt of every such application, the clerk of petty sessions shall forthwith forward a copy of the same to the local authority of the district and also to the inspector.

Representatives of local authority.

8. The local authority of the district may make to the Licensing Court such representations, in writing or otherwise, with respect to every such application, as the local authority thinks fit.

Report of inspector.

9. It shall be the duty of the inspector, upon the receipt of every such copy of an application, to inspect the premises in respect of which a license or the renewal of a license is applied for, and to report thereon to the Licensing Court. He shall either make such report in writing under his hand, or, if directed so to do by the chief inspector, shall personally attend at the sittings of the Licensing Court, and there orally report to the Court upon the same.

The hearing.

10. The Licensing Court shall sit for the hearing and determination of all applications for licenses on the first Tuesday in the months of January, April, July, and October in every year.

The Licensing Court shall sit for the hearing and determination of all applications for the renewal of licenses on the first Tuesday in the month of January in every year.

After considering the report of the inspector and the representations, if any, of the local authority of the district, the Court may, subject to these Regulations—

(1) Grant the application; or
(2) Adjourn the application for the purpose of the execution by the applicant of such works as in the opinion of the Licensing Court are necessary to render the premises suitable and proper for the slaughter of stock; or
(3) Refuse the application.

Duration of license.

11. Save as hereinafter provided, a license for a slaughter-house shall remain in force for the period of one year, but may from time to time be renewed for a like period. Provided that a new license granted for a slaughter-house shall only remain in force until the sitting of the Licensing Court held in the month of January following the date on which such license was granted. Provided further that all existing licenses shall remain in force until the sitting of the Licensing Court held in the month of January next.

Fees for licenses.

12. The annual fee payable in respect of the license or the renewal of the license of a slaughter-house shall be twenty shillings.

Fees for defraying expenses.

13. The fees payable by the licensee of a slaughter-house for the purpose of defraying the expenses of inspection shall be as follows, that is to say:—

	s.	d.
For every bullock, steer, cow, or heifer slaughtered ...	0	3
For every 12 sheep or calves slaughtered	0	3
For every head of swine slaughtered	0	3

Such fees shall be paid by the licensee to the inspector monthly, or at such shorter intervals as the inspector may require.

Receipt.

14. The inspector shall, upon the payment of such fees, give to the licensee a receipt under his hand in the form of the Second Schedule hereto.

Delivery note.

15. When stock are delivered at a slaughter-house to be slaughtered, the owner of the stock shall deliver to the owner of the slaughter-house a way bill or delivery note of the stock, setting forth the number, the description, and the brands or marks of the stock, and signed by the owner thereof.

The owner of the slaughter-house shall retain and preserve every such way bill or delivery note, and shall, on demand, produce the same to the inspector.

Slaughtering book.

16. The licensee of every slaughter-house shall keep a book called a "Slaughtering Book," in which shall be correctly recorded all the particulars set out in the Third Schedule hereto; and such book shall be open at all reasonable times to the inspection of any inspector, or any inspector of brands or police officer, who may make any copy of or extract therefrom.

Floors.

17. The floor of every place in a slaughter-house where stock are pithed or slaughtered, or where meat is dressed, prepared, treated, or stored, shall, if required by the inspector, be constructed of concrete or otherwise rendered impervious, to his satisfaction.

Drainage; ventilation.

18. Every slaughter-house shall be drained and ventilated to the satisfaction of the Inspector.

Blood.

19. In every slaughter-house all blood shall be boiled, desiccated, or otherwise treated to the satisfaction of the Inspector.

Privies.

20. Every water-closet, privy, cesspool, and urinal used in connection with a slaughter-house shall be situated at a distance of not less than one hundred yards from any building, enclosure, or place in or at which stock are slaughtered or meat is dressed, prepared, treated, or stored.

Pigsties.

21. Every pigsty, enclosure, and place where swine are kept at a slaughter-house shall be situated at a distance of not less than two hundred and fifty yards from any building, enclosure, or place in or at which stock are slaughtered or meat is dressed, prepared, treated, or stored.

Offal to swine.

22. Swine shall not be fed with offal at a slaughter-house, nor shall any offal be removed therefrom for the purpose of feeding swine, unless such offal has first been thoroughly cooked.

Notice of slaughtering.

23. The owner of every slaughter-house shall give to the inspector such notice of his intention to slaughter stock as will enable the inspector to inspect such stock.

Tampering with meat.

24. Until stock slaughtered have been inspected by the inspector the pleuræ are not to be stripped or otherwise interfered with, and no part of the carcass is to be cut away, manipulated, or interfered with in any manner which may prevent the discovery of disease or may alter the true condition of the meat.

The inspector may condemn any stock or meat which in his opinion has been dealt with in contravention of the provisions of this Regulation.

Branding meat.

25. When the inspector has inspected any meat and approved of the same, he shall brand each separate quarter of beef and each carcass or quarter of mutton with a mark or stamp.

Any person who wilfully removes or obliterates any such mark or stamp, or who, not being an inspector, affixes or causes to be affixed to any meat any such mark or stamp, is guilty of an offence against these Regulations.

Calves.

26. Calves less than four weeks old are not to be slaughtered for meat.

Condemned meat.

27. Condemned meat at a slaughter-house shall be rendered unfit for the food of man in the mode directed by the inspector.

Removal of hides, &c.

28. Offal and the hides, skins, heads, and feet of stock slaughtered at a slaughter-house shall only be removed from the premises in the manner and at the times directed by the inspector.

The contents of paunches and of intestines shall be deposited in the place appointed by the inspector for the purpose.

Carriage of meat.

29. Meat shall be carried from the slaughter-house to the butcher's shop in vehicles approved by the inspector.

Every such vehicle shall be provided with a proper roof, and shall be so constructed as to permit of a free current of air.

Meat shall be carried in such vehicle either suspended from the roof or sides thereof, or so arranged that a free current of air may circulate between the carcasses or portions of carcasses being carried.

Blowing meat, &c.

30. No person shall blow with his breath or otherwise into any meat, or eject any salt, liquid matter, or other substance from his mouth thereon.

No person shall treat, dress, or prepare any meat by means of any preservative or other substance which, in the opinion of the inspector, injures, or is likely to injure, such meat or to render it unfit for the food of man.

Offences.

31. Any person who contravenes any of the provisions of these Regulations is guilty of an offence, and is liable to a penalty not exceeding fifty pounds.

When a licensee of a slaughter-house, having been convicted of an offence against "*The Slaughtering Act of* 1898" or these Regulations, is on a second or subsequent occasion convicted of an offence against such Act or Regulations, the Court, by or before whom he is so convicted as last aforesaid, may, in addition to the punishment for such offence, order the license of the slaughter-house to be suspended for such time as the Court thinks fit, or to be absolutely cancelled, and such license shall be so suspended or cancelled accordingly.

FIRST SCHEDULE.

APPLICATION FOR A LICENSE OR THE RENEWAL OF A LICENSE OF A SLAUGHTER-HOUSE.

"*The Slaughtering Act of* 1898."

To the Licensing Court for the District of [*name of District*].

I [*or* we] hereby apply to the Licensing Court to be holden for the district of [*name of district*] for a license [*or* the renewal of a license] of a slaughter-house proposed to be established [*or* established] at [*describe locality so as to clearly identify it*].

Dated at the day of

Applicant.

SECOND SCHEDULE.

RECEIPT.

"*The Slaughtering Act of* 1898."

I have this day received from [*name of licensee or licensees*] the sum of £ , being fees in respect of stock slaughtered at the slaughter-house at [*situation of slaughter-house*], whereof he is the licensee [*or* they are the licensees], between the day of and the day of .

The particulars of the stock are as follow:—

Cattle [*insert number*]
Sheep and Calves [*insert number*]
Swine [*insert number*]

Dated at the day of

Inspector.

THIRD SCHEDULE.

SLAUGHTERING BOOK.

Date of Slaughtering.	Number of Stock Slaughtered.			Person from whom Stock obtained.	Brands or Marks.
	Cattle.	Sheep.	Swine.		

REGULATIONS UNDER "THE SLAUGHTERING ACT OF 1898."

Department of Agriculture,
Brisbane, 15th November, 1899.

HIS Excellency the Lieutenant-Governor, with the advice of the Executive Council, has, in pursuance of the provisions of "*The Slaughtering Act of* 1898," been pleased to make the following additional Regulation.

J. V. CHATAWAY.

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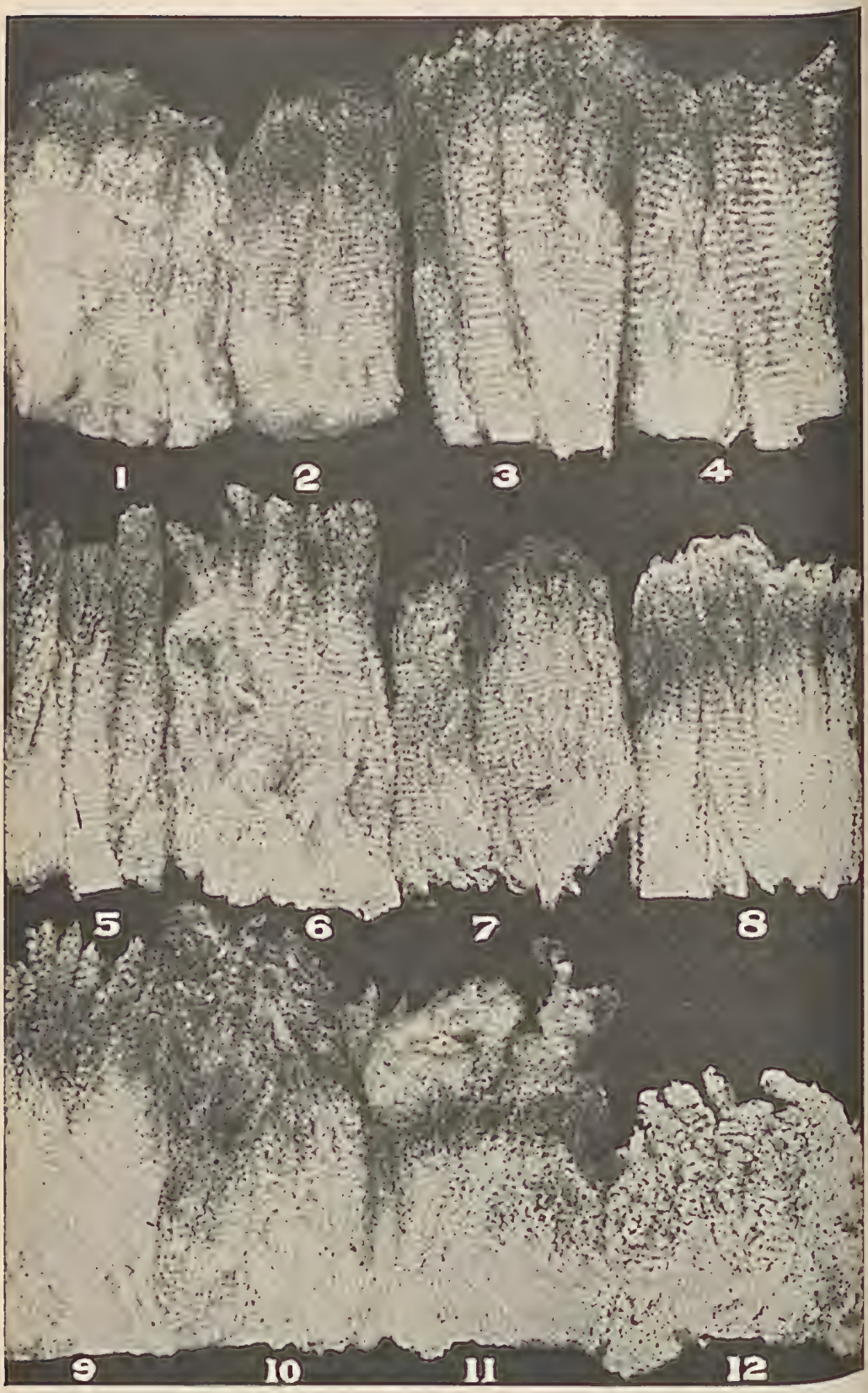
32. Clause 12 of the Regulations under "*The Slaughtering Act of* 1898," dated the twenty-fifth day of May, 1899, and published in the *Government Gazette* dated the twenty-seventh day of May, 1899, is amended by the addition of the following paragraph:—

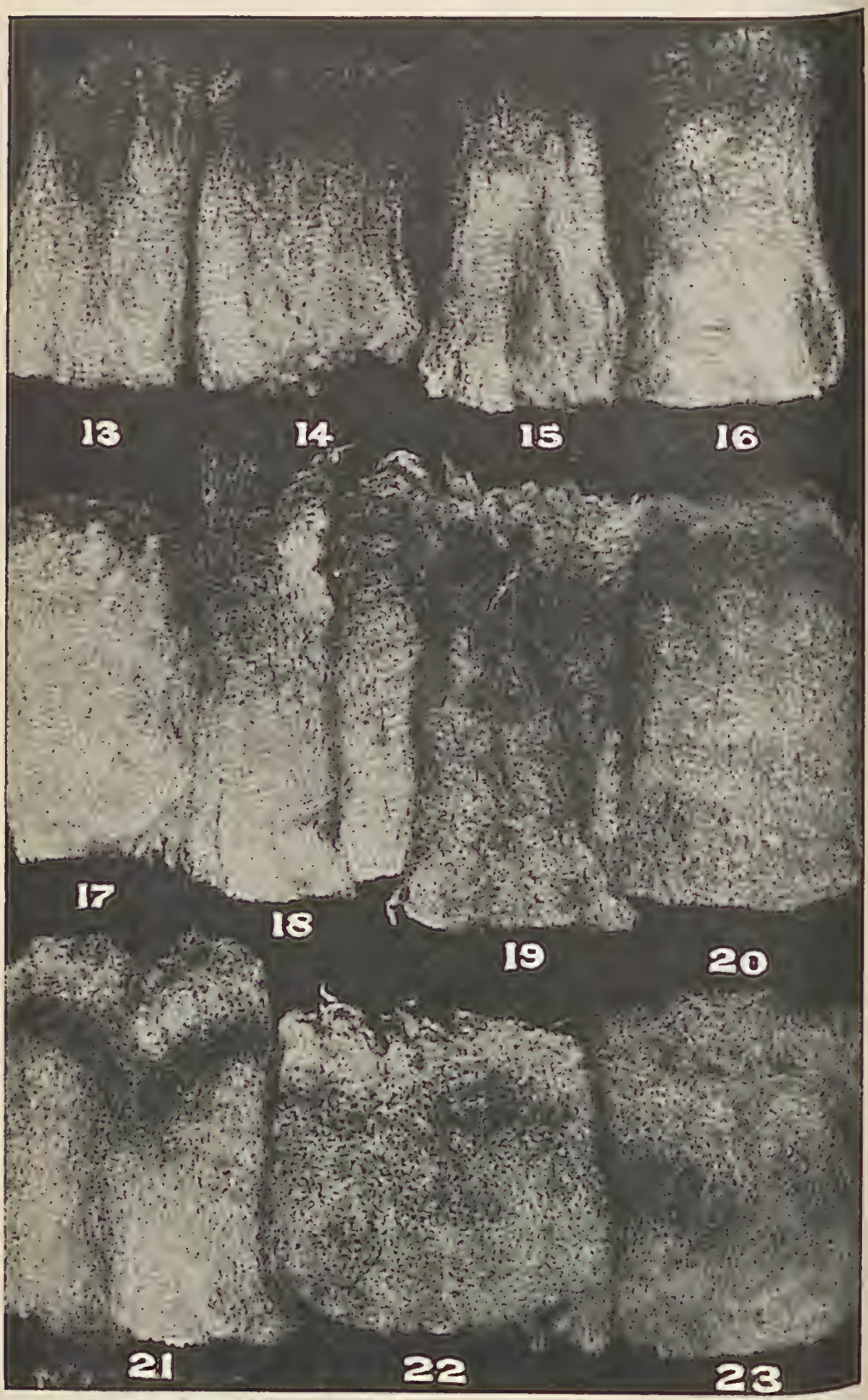
Provided that the annual fee payable in respect of such license or renewal of such license issued to persons who only slaughter calves and pigs, but not exceeding five head in all in any week, shall be two shillings and sixpence.

Plate CLVIIIA.



WOOL SAMPLES.

Plate CLVIII^B.



WOOL SAMPLES.

THE PRINCIPLES OF SHEEP-BREEDING.

The accompanying plates and description of the wools here illustrated should have accompanied Mr. J. S. Hermann Schmidt's sixth article on the principles of sheep-breeding. Owing, however, to the samples having reached this office too late for our artist to reproduce them, they were necessarily omitted. Those who get the numbers bound can have the plates put in their proper place in the volume:—

Description of Wool Samples.

1. Fine clothing wool, waving indistinct, waves flat not shafty enough and crepy. Texture unclear; tops too bulky; density moderate.

2. Fine clothing wool, waving more distinct, a more shafty formation. Texture clearer; tops still too large and bulky, fair density.

3. Fine combing; the shafty formation is more pronounced; the waving is more clearly expressed. The tops are divided into finer yet blunt points.

4. Combing wool of a very clear character; the staples are flat. Texture slightly watered; density fair.

5. Twisted staples. Want of density, associated with great trueness and a true semicircular wave, has favoured the formation of shafts that have grown up into a twist.

6. Want of density and of trueness has prevented the formation of solid shafts.

7. The waving is too distinct, and the staples show inclination to form very small shafts.

8. The same fault, more pronounced. Texture watered. The shafts assume the shape of ropes or threads—want of density.

9, 10, and 11 show how the waves have become too high and distinct. Want of density has prevented the staples from growing in a perpendicular direction. The bulk of the staple is hollow; the points are speary.

12. Faulty curly wool, similar to the threads of an unravelled sock.

13, 14, and 15 show very little or very flat waving, and very little inclination to form shafts. They are still fine good wools.

16 shows untrueness, whilst a sleek waving is still visible in some parts of the staple. Too much crepy admixtures of untrue fibres.

17. The waving has almost disappeared.

18. The top parts of the staples are much coarser than the lower ones.

19 and 20 show great untrueness.

21 to 23. Untrueness and want of density approaching mushiness.

By Authority: Edmund Gregory, Government Printer, William street, Brisbane.

OBITUARY.

Mr. HUGH W. GORRIE.

It is with much regret that we have to record the death of Mr. H. W. Gorrie, late Horticulturist at the Queensland Agricultural College. Mr. Gorrie, previous to joining the Agricultural Department, was for six years in charge of the propagating and forwarding department of the Acclimatisation Society, and was an ex-student of the agricultural classes at the Watt College, Edinburgh. He was appointed horticulturist at the Queensland College in March, 1897, and in a very short time had formed the fine vegetable and fruit garden which is always so much admired by visitors to the College. He also laid out and planted the various pretty flower gardens which beautify the main buildings, and planted the long avenues of trees from the railway siding to Lockyer Creek. As an instructor, he was very successful both theoretically and practically. In him the Department loses a valuable officer, and the students a painstaking teacher. Mr. Gorrie was 33 years of age at the time of his death, and leaves a wife and young family to mourn their loss.

The Farmers and the Fodder.

The still vexed question of the disposal of the wheaten hay crop on the Darling Downs brings forcibly to the front the advantages of co-operation. The Department of Agriculture has gone to considerable trouble and expense in devising some means of relieving the farmers of the large quantity of hay unfortunately thrown on their hands as a consequence of the heavy frosts of October last year. The Under Secretary (Mr. McLean) visited the Downs during the month of January, and invited the farmers to meet him and discuss the question in all its aspects. The response to this invitation was very half-hearted. In two or three localities—large farming centres—so little did the farmers care to help themselves that the attendance at three meetings amounted to nine, seven, and three respectively. To those who attended, Mr. McLean explained fully and clearly the position and action of the Department of Agriculture. He told them in unmistakable terms that the Department would not undertake to purchase the fodder. What it would do, and had been energetically doing for some time past, was to ascertain where the best markets were to be found, and at what cost the produce could be placed on them. There was an impression that the whole of it could easily be placed in South Africa, owing to the great demand for forage for the large numbers of horses, mules, and bullocks employed by the British army at the Cape and in Natal. This impression we also shared at the outset; but when full inquiry was made into the prices there obtainable, the cost of preparing the fodder for shipment, the rates of railage, dumping, storage, receiving and delivering, oversea freight, insurance, cartage, and commission, it was found that no profit whatever would remain to the farmer who shipped his produce to South Africa.

All this Mr. McLean clearly explained, quoting figures to prove the correctness of his conclusions. It might be said that by co-operation amongst the farmers a steamer might have been chartered to take over a trial cargo. But inquiry showed, first, that no vessel would be available for some months, all bottomry being fully engaged for a long time ahead; and, even if a vessel were to be obtained, the charter money would amount to some thousands of pounds, which would have to be paid in cash in advance.

The South African scheme having thus been proved to be illusory, the next best thing to do was what the Railway Department, after consultation with the Minister for Agriculture, has actually done—that is, the freights on farmers' produce sent to Brisbane to be forwarded to Northern and Western markets have been reduced by 33⅓ per cent. This fact may have been the reason for the small response of the farmers to Mr. McLean's invitation to the meetings. Now, could not the whole of this matter have been arranged by the farmers themselves through their district associations—such as that really live association, the Eastern Downs Horticultural and Agricultural Association, the Drayton and Toowoomba Society, the Royal Agricultural Society of Queensland at Toowoomba, the National Association at Brisbane, the Central Downs Association, and others?

The tendency to lean on the Government—to be wet-nursed, so to speak—is a growing evil. It tends to weaken the individual energies of the farmers, as well as to lessen the activity of the agricultural societies. If a merchant has a vast quantity of any product on hand—either owing to having over-bought or to a long drop in prices—he does not fly for relief to the Government and denounce it for declining to take the goods off his hands. Yet, on the farmers' principle, he would have just as much right to that assistance as they. In times of national disaster doubtless it is the duty of the Government to come to the rescue, as is done by the Indian and Russian Governments at this moment, owing to a famine in those countries. But that any small section of a body of

self-respecting, well-to-do men, representing but a portion of one district of the colony, should expect to throw its loss on the shoulders of the rest of the community (for that is what Government assistance means) seems to imply a weakness of purpose, a childish giving-in to one knock-down blow, which in a private individual would fall little short of being contemptible.

Let the farmers rise to the occasion now that they have the opportunity afforded them by the reduced railway rates. Fodder is scarce in many parts of the colony despite the late rains. Let them hasten to send away whatever they can spare, and, satisfied with a moderate profit, have the satisfaction that, after all the difficulty about the hay, they have helped themselves, and are beholden to none for that help.

Co-operation.

UNDER the present wasteful system of disposing of the produce of a farm, each individual producer makes use of animal power far in excess of what is absolutely required to effect the object in view. The same thing holds good with respect to fencing, clearing, stumping, and many other works on the farm. We see strong men toiling at a work single-handed which, with the help of a couple of neighbours, could be done in a quarter of the time and without any of the exhausting labour otherwise required. As an illustration which will commend itself to all scrub farmers, let us take the work of burning off. Sometimes a lucky burn will leave very little after-labour to be done, but often a very bad burn happens, and every stick almost has to be handled. A man working alone must do a tremendous lot of axe-work to enable him to pile up the timber in heaps. He has to cut the logs into lengths such as his strength is equal to carrying. He will thus make but a small impression by the end of the day on a five-acre patch of badly burnt scrub. Now, suppose that he has a dozen neighbours all employed at the same work, or even on a different class of work, such as stumping, pulling or husking corn, digging potatoes, or planting some crop. If these men would all combine to assist each other, it is clear that the work of burning off would be enormously lightened. A tree which the individual would have to cut up small, to enable him to deal with it, would be picked up bodily by six men and carried off with ease, all the axework being saved. It might be argued that, while these men are helping their neighbour, the work on their own farms is at a standstill. So it is—for a day or two, but now those who assisted the first man are in their turn assisted to plant, gather the crop, bale their hay, or to do any other work which may be pressing, and, so far from their having lost any time, their own work is far more expeditiously done by the assistance thus given. Again, take the case of a man having ten acres of lucerne cut and just ready to cart in. Everyone knows the disastrous effect of heavy rain on lucerne hay lying in the field. Rain is threatening, and the individual works himself and his horses from dawn to dark, and then finds that he cannot save his crop; but the neighbours come along with their teams, and the whole is safely got in before the storm. This is the commencement of co-operation, and it is easy to see how it works beneficially to all concerned. Now we go a little farther, and come to marketing. In the neighbourhood of towns it is a common thing for a man to yoke up a horse, or perhaps two, to cart in three or four bags of corn, some potatoes, cabbages, eggs, &c. This takes the whole day probably, and he expends sufficient labour on the business to perform double the work. His neighbours do the same thing. Now, if we count up the hours so lost by each individual, reckon the labour which all those horses and men could have got through in the day, and add to this loss the probable expenditure of a few shillings on creature comforts in

town, we shall find that the sum total will amount to more than the profit on the goods sold. If all those men were to combine and send their produce to town in a couple of big wagons, in charge of two or three of themselves, the work would be equally well done, and at a minimum expenditure of cash and labour. Why should every housewife collect a few dozen eggs, a few pounds of butter, honey, and other minor farm products which are her own particular province, and at the week's end drive to town with a cargo weighing, perhaps, a hundredweight? Would it not be far more profitable for all if these things were handed over to one individual to take to market and dispose of? There would be no middlemen's profits, no commissions to come off the returns, and thus there would be an end of what is not unknown to many farmers—namely, an account sales, with expenses piled up to a greater figure than the sale money, and a respectful request to the sender to remit the balance. Here, then, is where co-operation comes in again.

Some think that a co-operative store would be the panacea for the disabilities under which farmers labour in the matter of disposing of their produce and purchasing supplies. But it should be remembered that a store, to be a financial success, must be managed by smart business men. Farmers may be shrewd and intelligent enough, but they have not been brought up as business men—that is, as shopkeepers, financiers, bookkeepers, and commercial travellers; and however carefully a set of directors might think they were managing the business, they must, in the long run, go to the wall. Auction sales are thought to be fair and aboveboard methods of doing business. But here again the farmer is "euchred." The auctioneer may be a straight, fair-dealing man, anxious to get the best price for the goods he is selling. It is the buyers, over whose bids he has no control, who combine to keep down prices. What is easier for a lot of professional buyers, all known to each other, to combine to offer up to a certain figure and no higher? The majority of farmers are in a far different position to the woolgrower. If, at wool sales, prices do not suit the seller, he can afford to withdraw his lots and store them. He is not in any immediate hurry. The wool is an excellent asset. It will keep, and money can always be raised on it. The farmer's goods are perishable. If they are not sold, he cannot raise money on many of them. The farmer himself is probably in urgent want of money to carry out some work or get in some crop. The buyers know all this, and thus are able to get the produce at a figure which will leave them a handsome profit. It is little they care for the farmers. The best plan for the farmers of a district is to organise themselves into a society. But they will say they have done this all over the colony. There are 172 farmers' associations and seventy-five butter and cheese factories and creameries, many of these co-operative, in the colony. Leaving out the work of these factories, there are the associations and societies. What have these done for the farmers? With the exception of a few, they have done nothing more than collecting subscriptions and holding an annual show, which latter would appear to be the sole aim and end of most farmers' and planters' associations. Now, these societies could do a vast amount of valuable work for their members, provided that those members also do their share of the work. They should act as agents for the farmers; they should have their own reliable agent in every considerable town, to whom they would consign the produce of various kinds entrusted to their care by the farmers. They could arrange sales and prices in advance, by which action farmers would have no need either to hawk their produce or, if unable to sell, to leave it to rot in the barn or town store. Then, again, the society could act as buyers for their district. Goods bought wholesale are always cheaper than goods bought retail. Thus the farmers could send in orders for twenty tons of seed potatoes instead of paying through the nose for one ton. It would be the same with all farm necessaries, including sacks and implements of all kinds. There is no need to enumerate all the advantages this method of supply would bring in its train; they should be sufficiently obvious to all interested in buying in a cheap market and selling in a dear one.

There is, however, one thing which might be done by these societies, which, if well thought out and well carried out, would prove a blessing to many. We allude to the formation of a fund out of which farmers who require a small loan to tide them over a temporary difficulty could be assisted, and that with no loss of self-respect, for they could demand the loan as a right under certain conditions. There should be nothing of the land bank about this scheme. A little farther back, we spoke of most men spending a shilling or two in town when bringing in their produce Suppose that these shillings (which most can well afford or they would not spend them) were subscribed weekly to a fund operated upon by the president and committee of a farmers' association. In a district where 100 farmers are resident, if each were to subscribe, say, 1s. or 2s. weekly (the eggs would provide so much money and a good deal more, or they should do so, on a well-managed farm), these weekly deposits, to use a convenient term, would at 1s. per week produce £260, and at 2s. £520 in one year. For the first year after the formation of the fund, no borrowing should take place. The money would be placed out at interest for short periods, by which means the fund would be considerably increased. Now, when a farmer wanted a small sum, say from £5 to £25, he could borrow it for a short term at low interest, and repay the principal and interest by easy instalments. The fund would thus take the form of a savings bank, in which the farmer receives interest on his money, and on which he can draw for an emergency on the most favourable terms, fair security being given for the repayment. Such a scheme appears to us feasible, but would naturally require careful elaboration, and could only be successful by the hearty co-operation of the farmers themselves. That the advantages of complete co-operation are not seen and seized upon by all our farmers is one of those things that "no feller can understand." See how easily it works out. A man goes into a shop to buy 1 lb. of tea. The price is 2s. Suppose he took a chest. Then the price is 1s. 8d. And so with all goods—the greater the quantity purchased the less has to be paid. What more need be said on this subject? The wise man can understand it, but how many of us are wise?

Notes on Co-operation for Farmers.

By F. W. PEEK, Loganholme.

GREAT efforts have been made from time to time to induce the farmers and producers of this colony to combine or co-operate to achieve the better results accruing from united action; and, although the principles of co-operation have spread very rapidly in our sister colonies in the south, very little has (up to the present time) been effectively done in that direction in Queensland. The principles of co-operation can be grouped under two heads—co-operation for production or manufacture, and co-operation for distribution or purchase. The latter is, perhaps, the simplest and safest in practice, inasmuch as it is less dependent on that sort of supervision which is best insured by personal interest. Any association of farmers would naturally secure a large number of customers among its shareholders, although there would be nothing contrary either to justice or sound political economy in selling to other than their own members, providing their operations were confined strictly to the limits of legitimate trade. Co-operation for the production and sale of any article in large wholesale demand, such as flour, sugar, arrowroot, rice, coffee, &c., is more exposed to risk than a mere retail trade, because the shareholders can only be customers to a limited extent, and such a co-operative body has to look to other centres for markets to consume and distribute its products. The difficulty (and it is a great one) of obtaining skilled and trustworthy managers is greater. On the other hand,

it awakens less jealousy, for a large company of small capitalists works (as far as regards the customers) upon just the same principles as a small company of large capitalists. My immediate object in this article is to further bring under the notice of our farmers and producers the urgent necessity of combining together to establish co-operative associations and societies where such are not as yet established, and to induce those older bodies who are established to shake off the lethargy into which they seem to have fallen, placing them apparently out of touch with the farmers of their respective districts. Just now, when the formation of new councils and committees takes place for the ensuing year, is the time for those taking an interest in our agricultural producers to endeavour to reorganise such institutions on more broad and useful lines. Don't let an annual "show" be your one great aim and consideration, but rather let the agricultural advancement of your district be the first and primary object. Let your members be called together, say, not less than once a month to discuss the various questions of passing moment. Let papers be read and discussed by members, and their various experiences as to cultivation, cropping, marketing, &c., be exchanged. Ask your respective secretaries to be up to date, and keep moving, finding out the latest quotations and prices either for sales or for repurchases. No difficulty will be found in getting members to attend such meetings, as by taking a personal interest in each other farmers create a better feeling, and sociability begins to exist in the district as troubles are got over and remedied. By combining together, the Agricultural Department can be better approached. Its experts in the various branches of agriculture and production are placed at the services of the several districts and associations by the Government on application. This is the first step towards co-operative effort, and entails no outlay beyond the usual annual subscription to each existing society. As an instance of the advantage of co-operative purchase of seed or other farm requisites, a saving of fully 10 per cent. has been obtained by a Northern association, and also by one in the South of this colony, by placing of their orders to the best advantage. Let a society or, say, a small community of our farmers meet together, each one prepared with a list of what he may require for this season. By co-operating, and either getting quotations for the certain quantities required or even by calling for tenders (with samples to be submitted) for their requirements, a great saving will be effected, not only in the cheaper rates on a large order, but also in a better and more even quality being obtained. If the same system is carried out in the sale of farm products, taking care that the bulk is equal to the sample, better markets and better financial results must follow. I would refer those desiring to organise or wishing to extend association work to papers read on that matter at the Conference held at Mackay last year; also to the discussions arising thereon that were published in the *Agricultural Journal*, Vol. V., Part 2, pp. 139 to 145—from which much information may be obtained which would prove of great value in starting small co-operative societies for the purpose of purchasing and distributing amongst members. I have before me now a tabulated list of the various co-operative and distributive bodies of the world, which I append as showing the rapid advances that are being made by our farmers and producers in other countries :—

Country.	No.	Description and Objects.
England	960	Co-operative and distributive societies
Ditto	57	Land and building societies
France	700	Distributive societies or stores
Ditto	830	Productive associations
Ditto	80	Co-operative cheese and butter factories
Holland	100	Distributive societies
Ditto	60	Creameries
Germany	1,400	Distributive societies
Ditto	1,700	Productive societies (mostly creameries)
Ditto	1,200	Agricultural, for co-operative purchasing of seeds, implements, &c.

Country.	No.	Description and Objects.
Belgium	50	Agricultural societies for direct purchasing of seeds and supplies, beside several hundreds of creameries and distributing societies
Denmark	600	Distributive societies
Ditto	1,000	Farmers' co-operative associations, chiefly butter, bacon, and dairy products
Sweden	300	Creameries
Italy	500	Distributive associations
Ditto	1,000	Creameries for butter and cheesemaking A large number of farmers' associations for financial and other assistance
Switzerland	200	Distributive societies
Ditto	400	Workers' associations of all kinds
Spain	50	Agricultural societies for co-operative purchasing
Austria and Hungary ...	1,200	Distributive and agricultural societies for combined purchasing, sales, &c.
Canada	2,500	Co-operative cheese and butter factories; also a large number of agricultural and distributive societies
Australasia	500	Co-operative associations chiefly for cheese and butter, with only a few distributive associations.
South Africa	...	A few distributive societies
West Indies	...	A few agricultural co-operative societies for the joint sale of their members' products.

The above returns are from a publication received of the latest returns in November, 1898, and are simply farmers' organisations.

Agriculture.

THE VALUE OF SHELTER FOR STOCK.

IN the cold regions of Europe and America the question of shelter during the rigorous winter season is one of great importance, and yet it is one which does not command the universal attention to which it is entitled. The subject has two aspects. The first is that of profit, the second is that of sympathy with the sufferings of dumb animals which look to man who profits by their existence for care and protection. How common it is on many farms, whose owners are well able to care for their stock, to see the unfortunate cattle and horses, with their tails to the blast, freezing or rainy, or both at once, their legs drawn together, their bodies tucked up, backs arched, shivering with cold and wet, the very *beau ideal* of utter misery and dejection—a spectacle to call forth the commiseration of every right-thinking person. It may be said that wild animals do not suffer any inconvenience from this want of shelter, and therefore that kindred stock should not be any worse off. But this is quite illogical. The wild buffalo or bison on the vast prairies of America, the lion of the deserts of Africa, the deer on the bleak hills of Scotland, the chamois of the snowy Alpine peaks, the countless birds exposed to all vicissitudes of weather, are free to seek shelter known to them. They are not "cribb'd, cabin'd, and confin'd" in a twenty, fifty, or 100 acre paddock, often without even a solitary tree to protect them from wind or rain. The domesticated animals are simply helpless brutes, depending on their owners for little comforts which are too often withheld, and that to the detriment of the pocket of the short-sighted farmer. In this colony, shelter is required not so much against cold and rain (although that is much to be desired) as against the intense heat of the summer sun. It is no uncommon thing for farm horses and other stock to be sunstruck, and deaths from this

cause are often recorded. Yet how easy it is to prevent such a calamity. It is not whilst the horse is working that the animal suffers, but it is when it is shut up in a treeless, waterless paddock that its trouble begins.

Some time ago, the horses at the Queensland Agricultural College, when not working, were turned into a large paddock in which the trees had all been "rung." There was no shade of any description. The Principal of the College, Mr. John Mahon, did not wait for the slow action following an application for funds wherewith to erect shelters. He put on a few men and a wagon, and in a couple of days he had three fine sheds erected. They were built of rough bush posts, plates, and ties. Saplings were laid across the ties; on these were placed green bushes, and over all a layer or thatch of a couple of feet of old hay. During the hot part of the day the horses not required for immediate work gladly availed themselves of the grateful shade, as did the bulls, and calves, and pigs in their respective paddocks. Water was always near the animals in long troughs kept filled by a windmill. The cost of these sheds was a mere trifle, but their value in keeping the animals in comfort and consequently in good fettle for work was incalculable. They were also of great advantage on cold, frosty nights. Instead of shivering on the low flats which are always much colder than the hillsides, the cattle could spend a comfortable night under these sheds.

Professor Georgeson (Kansas) said:—"If I had to feed in the open, I would build a cheap but ample shelter of poles and wheat straw in the form of a half-circle on the north side of the lot. If possible, I would locate it on the south side of a hill, well above the hollow." This is precisely what Mr. Mahon did, and probably he never saw the above remark of the professor. If our farmers would only take a little more trouble to shelter their horses and dairy stock from blazing sun, cutting westerlies, and driving rains, they would find themselves recouped for their labour in increase of milk yield and retention of energy in cows and horses so cared for.

HARVEST OF 1899.

New Zealand has produced over 7,000,000 bushels of wheat and over 14,000,000 bushels of oats this season.

In Victoria the oat harvest is estimated at 5,200,000 bushels (5,523,000 last year) for 260,000 acres (253,000 last year), giving an average of 20 bushels (against 21·7 last year).

The barley yield estimates are:—For malting barley, 35,000 acres (33,561) at 18½ bushels (23), 677,000 bushels (776,000); and for feed barleys, 13,000 acres (14,200) at 24 bushels (23·5), 312,000 bushels (335,000).

The area cut for hay is estimated at about 500,000 acres, from which an average yield of 1 ton per acre is expected.

HARVEST WAGES IN ENGLAND.

The harvest of 1899 in England (says the *Journal of the Board of Agriculture*) was a good one both for the employers and the men who were employed. The employers, owing to the crops not being beaten down, were able to use self-binding machines and thus save labour, and also, owing to the fine weather, were able to get the harvest in very rapidly; while the men who were paid a lump sum for the harvest and those engaged at piecework were also able to get through the work quickly and without interruption. Consequently they earned their harvest money in a short time, and were free to go on with other work at the current rate of weekly wages. The harvest lasted from sixteen to twenty working days, and in some cases less. In the great corn (wheat)

growing counties of Cambridgeshire, Essex, Norfolk, Suffolk, and Lincolnshire, the average cash earnings per man for the entire harvest are estimated, on the basis of the returns received, at £7 11s.; and in the Midland, Home, Southern, and South-western counties, grouped together, at £4 12s.

In addition to cash payments, beer or cider is given in a number of cases, and sometimes tea, bread, butter, and cheese. In Norfolk and Suffolk, 1s. is often given for hiring-money, and also "horkey" money—*i.e.*, about 2s. 6d. for a supper at harvest.

A large employer of labour in Suffolk states that he paid £7 each to about 100 men on the farm he manages. Each man was paid £7 for 13 acres, and in addition was given 3 bushels of malt and 3 lb. of hops; 10s. an acre was given for cutting and carting every acre over the 13 stipulated acres.

In the fen districts in Lincolnshire and Cambridgeshire, the harvest is usually done by piecework, and in other parts a daily, weekly, or monthly wage is paid. Thus, on a farm in the Louth Union of Lincolnshire, where about forty men were at work at harvest, some were employed at piecework at 5s. 6d. to 7s. per acre, each man taking 20 to 25 acres; while some were paid £7 a month, and others 5s. a day.

In Northamptonshire a large employer paid the following rates:—4s. 8d. per day during harvest month; but nearly all the men have piecework (cutting with the machine, mowing, or tying), at which they earned from 5s. 6d. to 7s. per day, so that they received from £6 to £7 6s. for the month.

THE PRINCIPLES OF SHEEP-BREEDING.

No. 8.

BY J. S. HERMANN SCHMIDT.

WOOLLEN MANUFACTURE.

HAVING explained the nature of the wool fibres as animal products, as staple, and as fleece, I purpose giving a short description of the different proceedings necessary to manufacture wool into material for clothing. It is not my intention to make a lengthy and tiresome description of the manufacture of all different kinds of woollen goods; I merely wish to show why certain qualities of the wool are specially desirable, and for what special purposes this or that description of wool is suited. Several methods are adopted to unite wool fibres into material for clothing purposes. Firstly, felting; secondly, twisting into threads and weaving or knitting them together; or, thirdly, weaving and felting. In the following essay I have borrowed from R. Beaumont's handbook.

FELTING.

Felting is probably the most primitive method of working wool into material fitted for clothing purposes, and we see it even now employed in various ways. When speaking about the elasticity of the wool, I have tried to give an intelligible description of the felting process. I mentioned that all kinds of animal hair, as long as they are not too short, will felt into a solid and compact body; that the property of felting is by no means confined to wool fibres alone; and that any kind of hair that possesses some elasticity combined with pliability may be felted. Another method of joining hair or wool fibres in order to make clothing material is the twisting of them into more or less fine ropes or threads to be woven or knitted together (*i.e.*, spinning). The distaff and, later on, the wheel are the most primitive implements for spinning fibres into a yarn—now replaced by the spinning machines.

Before the wool is spun into yarns it has to undergo several preparatory treatments to which I can refer here very briefly only—namely, sorting, scouring, burr extracting, teazing, carding, combing, &c. Sorting is done for the purpose of removing from the wool by mechanical means all foreign particles

such as cannot be taken out by scouring; the fleeces are then partly broken up, if necessary, into subdivisions as to their fineness and qualities generally and as to their length and fitness for this or that purpose of the manufacturer. If the fleeces have been carefully sorted and skirted, and if they are of good quality and even throughout, a breaking up into several assortments on the part of the manufacturer is not necessary. In fact, good well-bred fleeces, carefully skirted and judiciously classed on a station, do not require any more sorting before they are scoured, which proves that the woolgrower can enhance the value of his clip very much by careful breeding, sorting, skirting, and packing, and by so doing save a good deal of trouble and expense to the manufacturer for which he is willing to pay the grower in the shape of a better price. I shall again refer to this matter later on.

Scouring.—I have already mentioned the principal features to be observed in scouring. At the same time we must remember that, whilst the woolgrower scours the wool to save himself freight, the manufacturer scours for quite a different purpose. His main object is to get rid of every particle of the yolk and other admixtures in such a way that, firstly, the wool may take the dye easily and thoroughly; secondly, that the desirable qualities of the wool are not alone preserved, but, if possible, improved. Whilst there is no difficulty in washing out those oily parts of the yolk, and those that have already been turned into a kind of soft soap through the action of the potash salts contained in the sweat—*i.e.*, the product of the sweat glands—there is often left a considerable portion of not saponified, sticky, waxy yolk which the best colonial scourer does not, except in very few cases, remove from the wool, particularly if the ridiculous opinion prevails that some yolk should be left in the wool, for fear of lessening the weight, &c. It is this sticky, waxy stearerin which gives so much trouble to the scourer at home. Professor Beaumont says:—"The object in scouring is not simply to remove the greasy product from the material, but also the dirt and other extraneous matter with which the wool may be covered. This should be effected without injury either to the physical structure or chemical composition of the fibre (that means, neither the cuticle nor the cortical substance itself should be injured). A wool thoroughly cleansed should be of a pure (white) colour, should handle soft and elastic, dye readily, produce a true thread, and ultimately form a texture full and velvet-like to the touch. On the other hand, wool partially scoured resists the action of mordants (substances employed for slightly corroding the surface of the fibre, to assist the dye to get hold of the substance of the wool), and takes a streaky colour, the dye not penetrating the fibre, but remaining on the surface."

Amongst the several detergents employed for removing the sticky yolk (stearerin), potash, carbonate of soda, ammonia, and soap are more or less employed; amongst these, potash and ammonia are those less liable to corrode the fibre. In many scouring establishments on the Continent, urine is employed, after it has undergone a process of fermentation, during which carbonate of ammonia is formed. The greatest success in removing every particle of fatty matter will be accomplished by the use of such chemicals as dissolve fatty matter within their own substance without decomposing it—such as benzine, ether, and bisulphide of carbon, and other similar substances. Not alone do these substances completely remove even the stickiest of yolk, but they permit of such fats being utilised again after evaporating the solvent. A good deal of wool grease is thus being obtained and turned to account—lanolin.

The temperature of the water employed in scouring should, for open, broad wools, range from 32 degrees Cels. to 54 degrees Cels.; for fine wools the temperature may range from 48 degrees Cels. to 60 degrees Cels. In many cases the strength of the solution of detergents necessary for the style of wool on hand is best ascertained by experiment. In factories, as well as in colonial scouring places, scouring machines are used. The wool is then rinsed out by a centrifugal machine, and finally dried in the air or in a hot-air drying machine, for description of which, however, we have no space.

TEAZING.

The scoured wool when dry is in a condition which necessitates its being subjected to some operation that will, in a measure, open and disentangle its fibres before being passed on to the scribbling machine. The technical name for this operation is teazing or willowing.

This machine consists of a large skeleton cylinder or drum with ten arms, each mounted with two rows of teeth tapering from the base to the point, and three small rollers termed "workers" fixed above the cylinder, and studded with teeth, which work between those of the latter when the machine is in motion. The wool is weighed out in regular quantities and spread on the feed sheet, which carries it into the interior of the machine, where it is received by the teeth of the main cylinder.

The principle of the machine is this: A large and centre drum, making from 400 to 500 revolutions per minute charged with wool, working against, or turning in a contrary direction to, a series of three smaller rollers making from thirty to forty revolutions per minute. So that no sooner is the material forced round by the main cylinder than the teeth of the workers come in contact with the felted and entangled locks, effecting a thorough separation amongst the fibres.

Burr Extracting.—It may either be done by chemical or by mechanical means. The former process consists in steeping the wool in a solution of sulphuric acid and water (standing at about 9 degrees Twaddle) for about-half-an hour, when it is taken out, allowed to drain, and then removed to the drying room and submitted to a temperature of about 100 degrees Fahr. The action of the sulphuric acid is due to the fact that it absorbs the watery elements from the substance of vegetable fibres, such as burr, leaving the carbon behind. During this process the vegetable matter is carbonised, whilst the horny substance of the wool remains sound.

The mechanical contrivance for removing burrs consists chiefly in a set of rollers so arranged that the wool staples get opened up, the burrs loosened so that they hang freely in the wool, in which condition they are knocked off whilst the clean wool is passed out.

After the wool has been scoured it has been deprived of its natural lubricant and is now in a dry, open condition, so that, if passed to other machines without being lubricated again, parts of it would be cast off the different cylinders of the carding machines in the scribbling processes and go to form "flyings" or "droppings."

Olive oil is commonly used for that purpose. It is applied either by the use of a can with a T-shaped muzzle or by a machine constructed for that purpose.

The wool now passes through a machine called the Fearnought, or tenter hook willey. By passing through it, the wool is still more disentangled out of its original conglomeration into staples, after which it passes on to the carding machines to be scribbled.

Carding is, in one sense of the word, a continuation, on a more systematic principle, of the separation and mixing of fibres of the wool, as it has been commenced by the teazer and Fearnought.

The carding machines are composed of a set of rollers that are studded with very fine steel hooks of different shape and position to each other, and the rotation as well as the speed of the rollers is so arranged as to thoroughly separate the fibres from each other in the first instance and rearranging their position again. They will in the end become so effectively crossed and blended together as to produce one promiscuous mixture of uniform density throughout. In scribbling there is no attempt made to lay the fibres in parallel lines, the very opposite of this effect being designed - namely, to mix and intermingle them on one common but uniform system. After the wool has been reduced to a state not unlike a sheet of cotton wadding, it is put on the condensing machine. The object of this machine is to reduce the sheet of fibres into compact slivers; that means into a series of soft, round, flabby threads, technically designated

"slivers," supplying to them a sufficient degree of uniformity, solidity, and adhesiveness, so as to make them capable of bearing the tension brought to bear upon them in the twisting process—*i.e.*, spinning.

The condensed sliver is nothing less than the basis of the spun yarn, for all that is requisite to make it suitable for weaving purposes is the addition of a twist. This, of course, is necessary to impart strength, firmness, and solidity—these essentials which are not present in the soft thread yielded by the condenser. Whilst the sliver is the result of rubbing a limited number of fibres together, the yarn, produced on the mule or spinning frame, is obtained by two distinct motions—firstly, that of twisting, compressing, and twining the individual fibres of which the sliver is composed firmly round one another, affording thereby strength, compactness, and tenacity to the thread; and, secondly, that of extenuating the sliver, which increases its length in the same ratio as it decreases its thickness or circumference.

The great variety of woollen materials is the result, in the first instance, of the particular construction of the yarn. This again chiefly depends upon the class of wool employed. According to the construction of the thread or yarn, we distinguish woollen and worsted yarns. Woollen yarns are composed of short and strongly waved wools. During the process of scribbling such wool fibres are placed in as disorderly position as possible, and no attempt is made by stretching the fibre to obtain greater length, and of removing the natural waviness or crimp. The system on which a woollen thread is formed may be defined as that of separating and recrossing the fibres, and finally of twisting the individual filaments firmly round one another when in a doubled or entangled state. The woollen thread is therefore made up of short wavy fibres, placed on the top of each other in a very disorderly or criss-cross position. Such a thread or yarn thus contains a great number of ends, sticking out here and there, so that the thread is rough and, as the fibres are in anything but a parallel position, more or less open or porous, no matter how strongly the fibres have been twisted together. To make a woollen thread, inferior descriptions of wool may be employed. The so-called worsted yarn is constructed on the opposite principle. The best wools are required for it, and a knowledge of it is thus of great importance to the woolgrower. All their attempts should be concentrated on the object of producing wool most suitable for the making of worsted yarns. The worsted yarn is made by, firstly, depriving the wool fibres of their wave; and, secondly, by arranging them into a strictly parallel position. The strength of the worsted yarn is based on the strength of each fibre, not the quantity of them. Its surface should be as smooth as possible, and reflect the light well. It should not be liable to shrink.

The wool suitable for making a worsted thread should, firstly, be very strong so as to stand a certain amount of pull. In this respect only perfectly true fibres, of the same diameter from top to bottom, are desirable, and they should be well nourished, showing no thin or brittle places. Great trueness is thus an important desideratum. This is generally more visible in regularly waved, though not too highly marked, than in sleek, not waved wools. All clearly waved yet not too marked wools, showing a perfectly perpendicular, shafty growth, dividing freely without showing untrue fibres running across from one staple to another, are preferred. Length of staple is likewise an important desideratum, although much shorter wools are now also worked into worsted yarns. Whilst the process of carding is necessary to most kinds of wool previous to their being employed for making either a woollen or a worsted yarn, for the latter kind the process of gilling has to be adopted. The object of it is to straighten the fibres, draw out and level the carding, and prepare the material for the combing machine.

Combing.—There is a twofold object to be attained in combing—first, to thoroughly adjust the fibres in parallel form; and, second, to remove the short curly fibres present in the wool. Gilling produces a fairly level ribbon, but if it is closely examined it will be found to be a combination of short and long,

crimpy and straight fibres. All neppy and wavy fibres, until straightened, are unfit for utilisation in the worsted yarn construction. For this reason the wool in the combing operation is divided into two distinct classes; that is to say, the long fibres of the gilled ribbon are combed and go to form what is called the top, while the short and wavy fibres are cast out as "noil." A worsted thread is distinctly the result of utilising the strongest and longest fibres contained in the stock, and hence the importance of the combing operation. By frequent gilling a level ribbon may be obtained, but to form the basis of a lustrous thread, with a smooth, uniform surface, something more is essential. The fibres which retain their crimpy character and resist the action of the gill pins must be extracted, and totally removed from the ribbon. Consequently one of the main functions of the combing machine may be defined as that of separating the short and curly from the long and straight fibres. Our space does not permit me to give a minute description of a modern combing machine, and I believe I have explained the difference between a woollen and a worsted thread sufficiently well to make a woolgrower understand the qualities that are essential in a valuable combing wool.

STRAW FODDER FOR CATTLE AND SHEEP.

IF Queensland farmers are suffering from a superabundance of unsold—but not unsaleable—wheaten hay, it must not be supposed that they are singular in the world in this respect. Let them look abroad and see what farmers in the old country do when they have too much straw on hand.

A statement appeared in the *Agricultural Gazette*, London, of December 18th from the pen of Professor Wrightson to the effect that "with an abundance of straw from last year's bountiful harvest, and the extremely low price of the article, it is difficult to know what to do with it."

"Vet.," in that journal, makes the following remarks on the subject which are worth noting:—

The farmers will naturally exhaust the surplus hay supplies first before before resorting much to the chaffing and preparation of straw dietaries; but when the haystacks diminish and the farmer perceives that he will require the whole of the residue for his cattle, the chaff-cutter will be put into action continuously, and there will be no longer any doubt as to what is best to do with the straw, which after being cut into chaff is available for such varied methods of treatment, all having one object—the supply of a wholesome, nutritious dietary to sheep, cattle, and horses alike.

Let me briefly enumerate some of the best approved ways of preparing straw chaff as food for stock. Being remarkably insoluble, and consequently indigestible in its dry state, it is a great advantage to cook, steam, or ferment it, or to impart softening influences by steeping it with other ingredients in a tank or large tub. Flockmasters having small quantities of roots in clamp have have often, under previous circumstances in former years, found it advisable to damp the straw chaff heaps and intermix into them just the quantity of root pulp which can be spared after making a calculation how the limited quantity can be eked out. A little meal soup must be added if the pulp addition be small, and meal or treacle soups make admirable substitutes when no roots whatever can be spared.

Steaming is another admirable way of rendering straw chaff not only more acceptable to the palates of cattle, sheep, and horses, but causing it to be more digestible, and a larger proportion of the nutriment contained to be extracted by the internal organs and assimilated. A very pleasant aroma comes from straw chaff after being steamed, and those who have the necessity to employ it as food might find advantage in making efforts to steam oftener than they do. When there are steam engines at farmsteads often set in action, it has been found strictly advisable to have a chamber or large receptacle near the engine where the waste steam is made to enter to operate on the chaff with which the

chamber or receptacle is filled. On other farms, there are steaming apparatuses for the cooking of small potatoes or any kinds of roots, and these may be utilised for the steaming of straw chaff also, or in the event of there being any fusty hay in the stackyard, even although it be perfectly white with must, if chaffed and pressed into a steaming apparatus, it will come out purified with the self-same agreeable aroma straw is possessed of after being steamed. Small farmers who could not afford to buy a steaming apparatus have been known to place a disused cask over an ordinary furnace, the bottom having been previously perforated with gimlet holes. With the furnace filled with water, and chaff pressed tightly into the cask, it only requires to ignite the fire and raise the water in the furnace to boiling point to make volumes of steam rise through the chaff to bring about the same beneficial change the steaming apparatus would effect.

The Scotch are exceedingly fond of mixing up messes for horses and cattle, of which straw chaff often forms the principal ingredient. Steeped in boiling water, even bean straw, the most nutritious of all the stalks of cereal and leguminous crops, becomes softened and digestible. Bean or pea straw cooked with small potatoes or other roots, and having bran, pollards, or meals added, can be converted into excellent rations for live stock.

RATIONAL MANURING.

A fertiliser alone will not ensure a good crop; for the fertiliser that feeds the plant also feeds the weeds. Therefore a more perfect cultivation will be necessary. An abundance of plant food, a careful cultivation, and a favourable season must all unite to produce a rich harvest.

Every crop removes from the soil a portion of the plant food contained therein. Continuous cropping will, in time, exhaust the richest soil, unless the farmer restores to it the nutritive elements that have been removed.

Agricultural chemistry has demonstrated that plant-life calls imperatively for three prime forms of food. These three are phosphoric acid, potash, and nitrogen. The annual products of the farm (milk, grain, grass, roots, &c.) remove from the soil large quantities of nitrogen, potash, and phosphoric acid. A portion of these food elements is returned to the soil in the form of stable manure, but the remainder have been lost, and the productive capacity of the farm can only be maintained by the use of commercial fertilisers.

Muriate of potash is the cheapest form of potash, and is the best source of potash, except in special cases, where chlorine may injure the quality of the crop, such as tobacco and oranges. For such crops, sulphate of potash or sulphate of potash magnesia should be used. Kainit is another form of potash salt, containing chlorine, and is specially valuable upon sandy soils. It is valued not only for its fertilising properties, but for its power of destroying insect life and curing plant disease. As regards its application to strawberries, Mr. A. H. Benson, Instructor in Fruit Culture, says that, if applied broadcast to strawberry plants, it would burn the leaves more or less, especially if they were at all damp at the time of application. In Queensland, the growth of the strawberry is so rapid that it is always advisable to apply any manure that may be required by the plants to the soil before planting, so that it may be at once available. Top dressing is not so satisfactory.

Wood ashes are also a valuable source of potash, but the amount contained in them is small and variable. The most important materials for supplying nitrogen which are largely used in the composition of commercial fertilisers are the following: Nitrate of soda and sulphate of ammonia, in which the nitrogen is in a soluble and available form. Nitrate of soda is particularly adapted for top dressing during the growing season, and is the quickest acting nitrogenous fertiliser.

Leguminous crops, such as peas, beans, lucerne, vetches, clover, &c., gather their nitrogen from the air; hence an application of nitrogenous fertilisers to such crops is unnecessary.

By taking advantage of this property of leguminous crops, we may obtain from them a portion (and sometimes even all) of the nitrogen required by other crops. If ploughed under, the legumes will not only furnish nitrogen to the soil, but also humus, which improves its physical condition. This is known as "green manuring." On sandy land and in a hot climate, it is not advisable to plough under a heavy growth of these plants while in a green condition. If the soil is very deficient in vegetable matter, the crop should be allowed to die upon the land and then be ploughed under in cool weather. If it is necessary, however, to plough under a green crop, a good dressing of lime, not less than 30 bushels per acre, should be applied to prevent injurious souring of the land.

Barnyard or stable manure is regarded by many farmers as "a complete fertiliser." This is correct only so far as it contains all three of the fertiliser ingredients, but these ingredients do not exist therein in the proportions required by most crops. Stable manure contains proportionately too much nitrogen and not enough phosphoric acid and potash to be considered a "complete fertiliser."

By a proper rotation of crops and by "green manuring," stable manure can, in fact, be dispensed with, and in some cases such a course is even preferable. The old saying that stable manure is indispensable to successful farming is not now regarded as an axiom. A manure containing an excess of nitrogen will unduly increase the growth of leaf and straw at the expense of fruit or grain. To avoid such a result, stable manure should always be supplemented with artificial fertilisers containing phosphoric acid and potash.

The amount of kainit which should be added to fresh stable manure to prevent loss of ammonia through heating is 1 lb. per day for each cow or horse or for eight head of sheep. The kainit will save more than its cost in the value of the nitrogen which it retains, and will possess its original value as potash food.

Swampy and peaty soils, which consist largely of humus, and which, as a rule, are rich in nitrogen, derive only slight benefit from stable manure. Such soils need lime, potash, and often phosphoric acid. The application of these forms of fertiliser is followed by largely increased crops. Phosphoric acid and potash will prove of slight value when applied as "top dressing" during the growing season When so applied, these fertilisers will stay on the surface and out of the reach of the roots of the plants. Phosphoric acid and potash are "fixed" or retained by the soil. They are not volatile, nor do they leach through the soil. It is quite different with nitrogen. When organic matter, exposed to the air, decomposes, a portion of the nitrogen present volatilises and is lost in the atmosphere. The remainder, unless absorbed by vegetation, is finally washed away. Nitrogen in the form of nitrates readily leaches through the soil. Nitrate of soda may, therefore, well be applied as a top dressing during the growing season.

The commercial fertilisers now in the market are the most desirable supplements and substitutes for stable manure that can be obtained by the farmer. In complete fertilisers the nitrogen, phosphoric acid, and potash are skilfully compounded in various proportions. They are in a finely ground and thoroughly commingled condition, can be applied by drilling, and can be easily mixed with the soil. Their value is accurately determined by the various agricultural stations, and the interests of the farmer carefully protected.

AGRICULTURAL EDUCATION.

AN American paper remarks that the school to which the farmer should send his boys, if he desires them to inherit his acres and keep his homestead, is where his boy can be taught agriculture, pure and undefiled, in all its branches, and the school that gives employment to teachers that have good practical agricultural sense, instead of theoretical agricultural nonsense. The great trouble in many schools where agricultural science is taught is that the teachers

are not practical men. Too many of them, if given 100 acres of the best land in the country, fully equipped with live stock and farming utensils, could not run the business five years without putting a mortgage on the farm. Therein is where much of the trouble lies at the present day in the education of the farmer boy. Too much of it is of the kind that educates him off the farm, instead of preparing him for his work.

OVERHEAD NETTING FOR TOMATOES.

A correspondent of the *Garden and Field* says on this subject:—This is a plan I have not tried, but I know where it is used with success. A number of stakes 2 inches or so in thickness, and from 18 inches to 24 inches long, are prepared and driven in the ground at intervals along the row of plants, thus:—

```
o   o   o   o   o
  o   o   o   o
o   o   o   o   o
  o   o   o   o
o   o   o   o   o
```

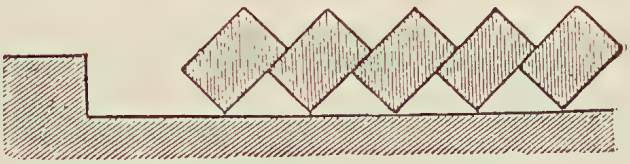
The stakes are driven so that the tops are even and about 12 inches out of the ground; and over the whole a piece of wire netting of 2 or 3 inch mesh is stretched and nailed to the tops of the pegs. The plants are allowed to grow up through the netting and spread over the upper surface. I believe the plan answers well, and has the merit of being no trouble after being put up. In this case the growth of the plants is not regulated. I describe it for the benefit of readers, and am trying it on a row of plants. I shall, however, use a less number of pegs, and put crosspieces of batten to support the netting.

If the tomato plants show signs of disease by an unhealthy appearance of leaves, or scabby fruit, they should be at once sprayed with Bordeaux mixture of a strength of 4 lb. of bluestone, 4 to 6 lb. of quicklime, and 40 gallons of water.

TYPES OF FURROWS.

THE RECTANGULAR FURROW

Is the one most commonly adopted, a fair amount of surface is exposed, the furrows lie compactly, surface rubbish is well buried, and the soil of the furrow

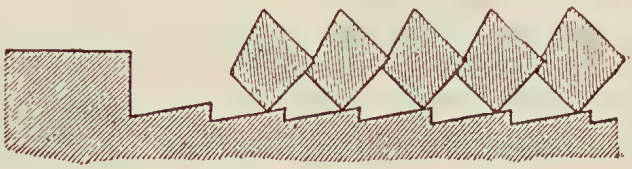


Section of Rectangular Furrow.

is level, thus allowing the water to run freely from the top to the bottom of the ridge.

THE CRESTED FURROW

exposes a greater surface than the preceding type, and is therefore more influenced by the weather, and is more easily worked to a seed bed; on some soils there is a difficulty in making the furrows pack together neatly, consequently

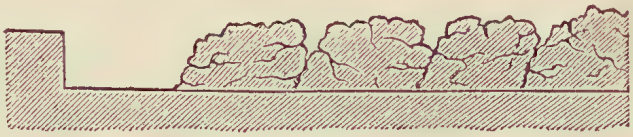


Section of Trapezoidal Furrow.

the surface rubbish is not well covered. Another objection is that on the land lying in ridge and furrow the notched soil hinders the water from running freely to the water furrows; also, when cross ploughing or turning the furrows back subsequently, the ledge left has to be cut, and this adds materially to the work; besides, a raw piece of soil is brought to the surface, which is objectionable, because it will work harshly and tend to spoil the quality of the seed bed. At the same time the crested furrow is far better than a compressed furrow laid flat.

THE BROKEN FURROW

turned by the digging plough is the most suitable form for all but a very limited number of purposes. On very light soils it is desirable to consolidate the seed bed, and generally it is advisable to consolidate a seed bed to be sown with wheat. At present there are many farmers who, basing their judgment on the experience



SECTION OF WIDE BROKEN FURROW.

obtained with flat furrows made by the common compressing plough, do not favour the digging plough for winter fallow ploughing, but their number is rapidly decreasing, as they see how well the dug furrow turns out in the spring. For all other seed beds the digging plough is far superior to the common plough, as the action of the digging breast is to loosen and disintegrate the particles of soil, and so produce a kindly tilth easily affected by frost, rain, and sunshine.—*Agricultural Gazette* (London).

Dairying.

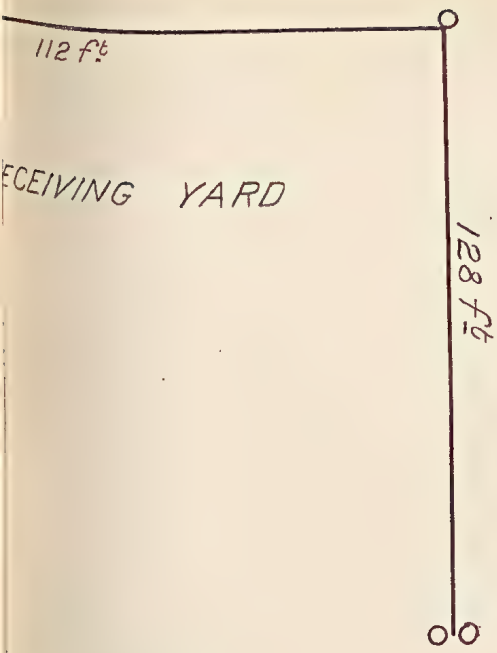
DAIRY CATTLE AND YOUNG SORGHUM.

WE have, on several occasions, received information from various parts of the colony of cattle dying from the effects of indulgence in Kafir corn, &c. It was supposed that the animals were poisoned by some plant, but, as the Government Botanist, Mr. F. M. Bailey, F.L.S., has repeatedly pointed out, there is no such a thing as a sorghum possessing poisonous qualities, and, further, no true grass of any description is poisonous. Grasses, wheat, and maize are subject to "ergot," which is extremely poisonous, but no active poisonous principle exists in them or in any of the sorghums, and Mr. Bailey is not prepared to say that ergot is found in sorghums.

Again, a Toowoomba correspondent wrote corroborating Mr. Bailey's opinion, stating that twelve of his horses got into a field of Kafir corn just coming into flower. They remained in it all night, and in the morning, beyond looking considerably blown out, no evil effects were observed, nor did the animals suffer in any way. All evidence goes to show that no animals are poisoned by over-indulgence in sorghums, but that, in some cases, "hoven" may result.

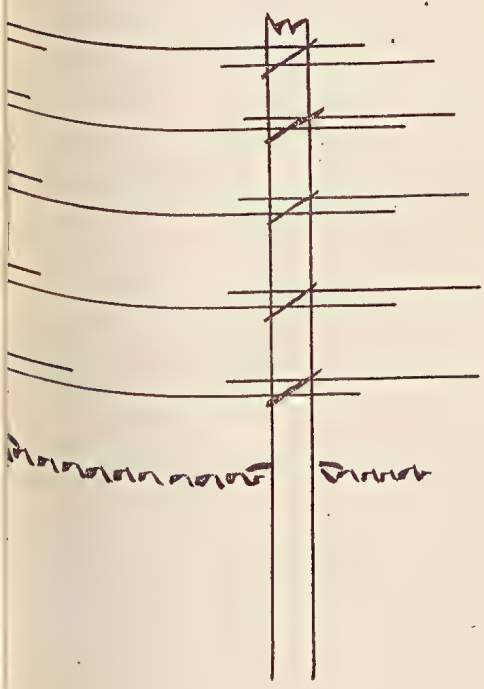
A correspondent at Wynnum, Mr. R. Woolcock, writes on this subject:—

"As a dairyman of over thirty years' standing in the colony, I deplore the repeated reports of cows dying from the effects of eating young sorghum. If my observations will be the means of saving some of the dairy stock in the future, I shall be pleased. Those who are experienced in the feeding of stock know



112 ft

WING

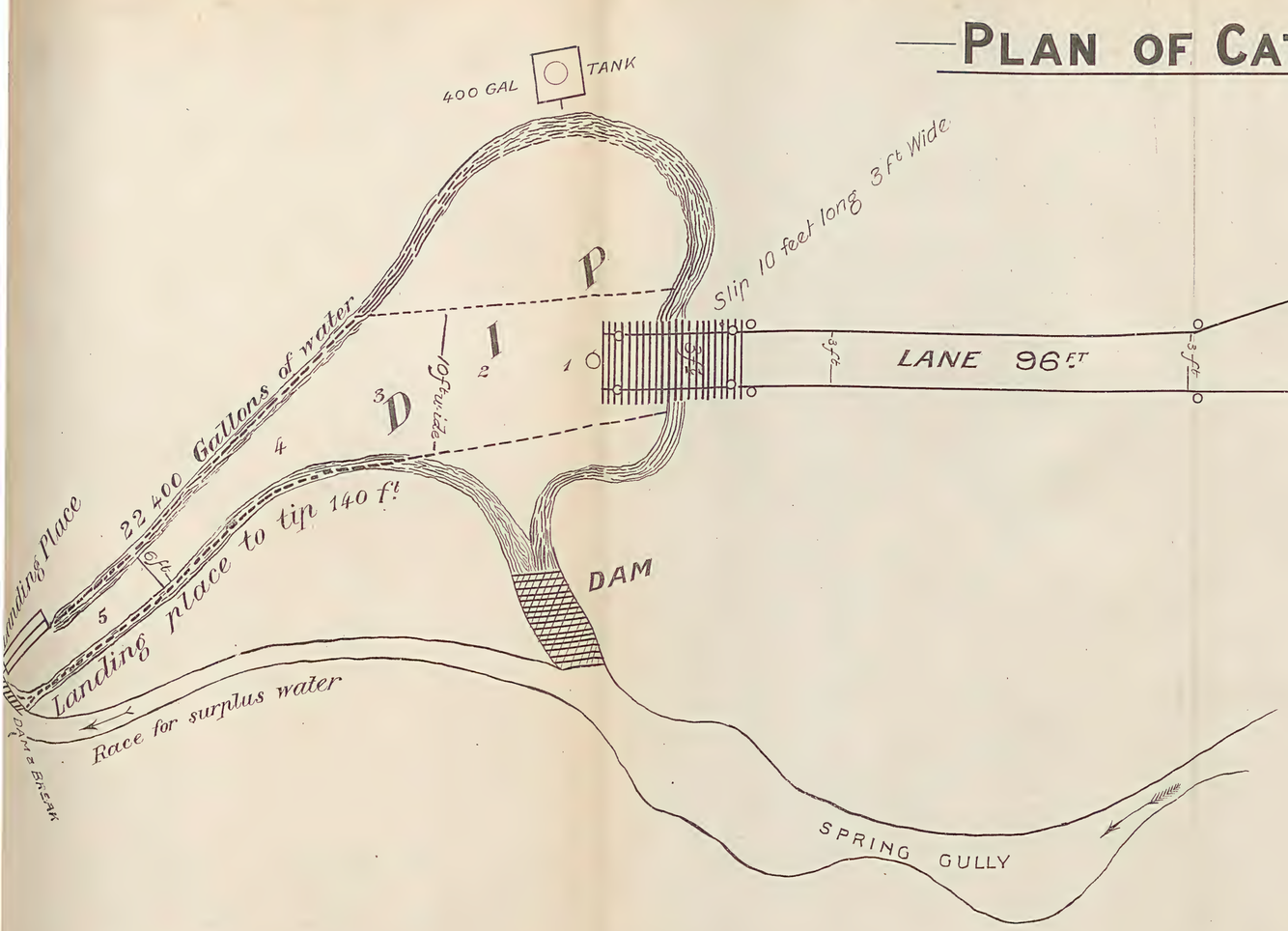
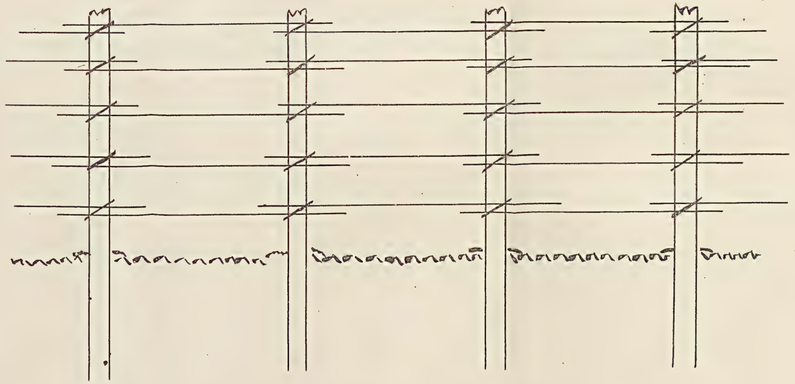


ails in position

wire ties

n street, Brisbane.

PLAN OF CATTLE DIP



Section of Fence showing rails in position when fixed to posts with wire ties

By Authority: EDMUND GREGORY, Government Printer, William street, Brisbane.

that they run a certain amount of risk in turning them on to any kind of greenstuff, especially if it is immature, and even on to grass paddocks recently burnt and shut up. Yet it is not the novice alone, but also the old experienced dairyman, who is rudely awakened by the dying off of a number of his cows through their eating young sorghum. The deadliest effects I find occur when there is a stunted growth as in a drought, or when there is a spasmodic spring after a thunderstorm, those growths being, I presume, more productive of gas than the naturally growing herbage during a good season. Some believe that at a certain stage of growth sorghum is poisonous. I do not share that opinion, as I have cut it when green feed has been very scarce, and have chaffed it with hay, feeding the mixture to the stock with no ill effects to the cows. The best-conditioned and heaviest milkers, and consequently the most valuable for the time being at least, succumb to the gaseous effects. My advice to dairymen who are tempted to utilise, when feed is scarce, any young growth of sorghum by feeding it off, is to refrain from doing so, for it is as hazardous as shooting with a loaded rifle promiscuously amongst the herd."

The Assistant in the Division of Agrostology of the United States Department of Agriculture, writing on the subjects of millets, says:—In some sections of the country the foxtail millets have gained the reputation of being injurious to certain kinds of stock, and are therefore regarded with suspicion by many farmers and stockmen. Like many other forage plants, these millets become very harsh and woody with age, the beans are stiff and harsh, and are not only difficult to digest, but produce more or less irritation in the digestive tract of the animal, and sometimes unite with other indigestible substances, forming compact balls in the stomach, ultimately causing death. Again, immature and over-ripe foxtail millet is said to produce abortion in brood mares and cows, but this has not been established experimentally. Millet in any stage of growth acts as a laxative and diuretic. Cut while the plants are quite young, it appears to be most strongly laxative, while over-ripe hay is most strongly diuretic. However, if cut at the right stage of growth, the action will not be sufficient to lead to serious results if other hay or coarse forage is fed along with it.

A CHEAP CATTLE DIP.

From Mr. P. R. Gordon, Chief Inspector of Stock, we have received the accompanying plan and specification, of a cheap and effective cattle dip, constructed by Mr. C. T. Morgan, of Mount Castor, Mackay. Mr. Gordon says that it is by far the largest and decidedly the cheapest—so far as construction is concerned—in the colony. As there are many waterholes throughout the tick-infested districts which might be utilised for cattle dips according to Mr. Morgan's cheap plan, he recommends that the description be published for general information.

In complying with Mr. Gordon's request for particulars of the dip, Mr. Morgan courteously forwarded a plan (here reproduced), with the following note:—

My long and painful experience of the ticks and Texas fever is such that I have no hesitation in declaring in favour of dipping as against inoculation as a preventive against fever.

I have proved beyond doubt that fertilisation in the tick ceases after the immersion.

Another matter on which I am thoroughly satisfied is this: If cattle, in the early stage of the fever, are put through a strong solution, the feverish symptoms will at once disappear. I assure you I do not make these assertions without the fullest significance of their meaning; and as you have stated your intention of giving the fullest publicity to my plans, &c., when they reach you, I am desirous that you be supplied with nothing but solid facts as they have disclosed themselves to me through the closest observation from time to time.

I have now very much pleasure in handing you herewith, under separate cover, a complete plan and specification of the dip planned, erected, and worked by me with every success.

The plan is only a rough one—not being drawn to scale—but is, I hope, sufficiently descriptive for the purpose for which you require it. The accompanying "key" will, I think, be sufficiently clear, and the estimate of cost of erection is quite reliable.

In my letter to the *Queenslander* I stated that "a dip to treat 1,000 cattle per day can be erected—other things being, of course, equal—for the sum of £45, including all the ingredients necessary to charge the pool."

It was principally owing to the fact of all "things being equal" that I was enabled to erect the dip so cheaply, and I do not see why others should not be able to do so as well as I myself have done.

Some three years ago, when dips were first spoken of—and it appeared as if they were likely to be at least partially successful—I looked round me for some very much cheaper and at the same time equally effective means of treating the stock, when the washpool of the early days came to my mind. After thinking the matter over, I found a suitable waterhole, and a good supply of saplings within a mile of the site.

After calculating the quantity of timber required for the work, I put men on to cut it, and three weeks from the day I started I had the first mob of cattle through the solution.

All that is necessary is for a community of settlers to select a waterhole within a reasonable distance (say one mile) of a good supply of straight saplings, and the rest is easy.

The solution I used is known as Masterton's—tar, soap, and soda—8 oz. tar, 8 oz. soda crystals, and 4 oz. soap to every 10 gallons of water. The quantity of tar and soap was never varied by me, but I was much more liberal with the soda, as I honestly believe it was solely owing to the quantity of soda I used that the ticks were killed at once. In short, my dip was charged with 2 tons of soda crystals instead of one, and it is to this fact, and also the time the cattle were in solution, I attribute my great success. As my plan shows, the distance from the slip to the landing place is 140 feet; and during the time the cattle are travelling that distance, their points are being thoroughly soaked in a solution strong enough to kill a tick inspector, let alone a tick.

Instead of 3 hours, I always boiled my charge for 5; and when ready for the pool, it was run into the middle of it by means of a spout.

I put the tank on the bank of the pool from where we got the water to boil. Even when the solution was strong I used to put it in the tank to boil up extra soda—when I thought it was necessary to add any to the dip. By adopting this plan there was no expense incurred in carting water.

Where necessary, stakes were driven in—close to the banks—and on these the guides are tied so as to rest on the surface of the water. These guides keep the cattle moving in the direction of the landing.

By means of a "float" which I had fixed up, I was always able to ascertain the quantity of water the dip had made—by leakage through the dam—between any two dippings of the stock, and boiled sufficient stuff to bring the solution up to the required strength again.

As I have already stated through the Press, I have put 521 head of mixed cattle through the dip in 24 minutes; and altogether 12,000 have been put through without an accident.

You have now all the information that I can think of at present.

In conclusion, if a group of stockowners should decide to go in for one of these dips, my advice is *do not spare the soda*—an extra dose can do no harm.

KEY TO PLAN.

One end of the "slip" is made fast, with wire, to the bottom of the two end lane-posts; and the other end is allowed to rest on a bearer under the water in the pool.

The black dotted lines running through the whole length of the pool represent guide bars fixed on the surface, to steer the cattle to the landing place.

This end of "slip" is 18 inches under water.

	Feet	inches.
The depth of water at figure 1 is	5	0
,, ,, ,, 2 ,, ...	6	6
,, ,, ,, 3 ,, ...	4	9
,, ,, ,, 4 ,, ...	3	6
,, ,, ,, 5 ,, ...	2	6
,, ,, ,, 6 ,, ...	7	0

From end of slip * to landing place is 140 feet.

The dam at the narrow end of the pool is very small, and is protected by a couple of rails which turn the cattle on to the landing place.

The landing place is of a gritty ironstone formation, and is thoroughly hard, consequently no bogging takes place.

The pool contains about 22,400 gallons of water, and to charge this to the proper strength (Masterton's cure) one ton each of coal tar and soda crystals, and half-a-ton of No. 2 soap is required. The tank for boiling the solution is a 400-gallon ship's tank, with a large flow tap.

SPECIFICATION.

All round timber is used in the construction of the yards, &c.

Posts—9 feet long, 10 inches diameter, 3 feet in ground, and placed 14 feet apart.

Rails (saplings)—3 to 5 inches diameter, 16 feet long, giving a lap of about 1 foot at each post. Five rails to one panel.

Each post to have five nicks, at equal distances, in which to tie rails by means of a piece of No. 7 wire.

Rails to be tied on inside of posts.

Posts in the lane are braced on top with wire to keep the fences from bursting out.

The "slip" is built on the same principle as a span of a wooden bridge: two girders 10 feet long; decking of round saplings 5 feet long, and two kerb logs; the whole braced together with iron bolt at each corner, passing through kerb, deck, and girder.

The double posts at entrances are so placed to receive sliprails.

Tank-stand consists of piece of ground 8 feet square, being made level, and having a drain 18 inches deep and 18 inches wide cut through middle of ground. Over this the tank is placed, and fire made in drain on both sides of the tank. The tank-stand can be made on bank of pool, and all water for boiling the ingredients can be taken from the pool.

DIP—COST OF ERECTION, &c.

To 5 men for three weeks, at 20s. per week each	£15	0	0
Rations, at 6s. per week per man	4	10	0
2 coils No. 7 wire (for tying), at 13s.	1	6	0
1 400-gallon tank and tap	4	0	0
1 ton coal tar	2	15	0
2 tons soda crystals, at £5 10s.	11	0	0
1 ton No. 2 soap	2	15	0
	£41	6	0
Carriage and railage on tar, &c.	3	0	0
Fuel to boil tank	0	5	0
20 feet discharge spouting	0	7	6
Cost of boiling charge—wages and rations	0	4	4
	£45	2	10

THE DAIRY HERD.

QUEENSLAND AGRICULTURAL COLLEGE.

RETURNS FROM 1ST TO 31ST JANUARY, 1900.

Name of Cow.	Breed.	Date of Calving.	Yield.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.			
Annie Laurie	Ayrshire	12 June, 1899	382	4·4	18·8	Dry, 28-1-00
Isabelle	,,	2 June ,,	412	3·9	17·9	
Lena	,,	17 June ,,	156	4·1	7·15	Dry, 20-1-00
Linnet	,,	19 June ,,	891	3·7	36·91	
Rosebud	,,	13 April ,,	123	3·8	5·23	Dry, 17-1-00
Leesome	,,	12 Oct. ,,	985	3·8	41·9	
Ream Routhie	,,	19 Sept. ,,	657	3·6	26·45	
Laverock	,,	7 Dec. ,,	1,235	3·5	48·4	
Effie	Jersey	16 Dec. ,,	638	4·5	32·15	
Content	,,	11 July ,,	663	4·8	35·63	
Eileen	,,	13 Aug. ,,	672	5·0	37·6	
Jersey Belle	,,	4 July ,,	453	4·9	24·85	
Stumpy	,,	1 July ,,	703	4·6	36·2	
Playful	,,	6 Aug. ,,	491	4·0	21·99	
Ivy	,,	2 Oct. ,,	467	4·8	25·09	
Opale	,,	16 Dec. ,,	744	4·5	37·49	
Beatrice	,,	19 Oct. ,,	489	4·9	26·83	
Bashful	,,	16 Nov. ,,	511	4·5	25·74	
Connie	,,	29 Sept. ,,	424	4·4	20·88	
Scarlet	South Coast	13 Oct. ,,	667	3·8	28·38	
Misery	,,	4 May ,,	618	3·9	26·99	
Toughy	,,	11 Sept. ,,	623	3·0	20·93	
Plum	,,	3 Dec. ,,	693	3·2	24·83	
Banjo	Devon	5 Oct. ,,	385	4·0	17·2	
Broad	,,	5 Oct. ,,	662	4·3	31·8	
Rosie	,,	11 Oct. ,,	635	3·4	24·18	
Monday	,,	24 Oct. ,,	582	4·1	26·69	
Patience	,,	5 Oct. ,,	445	3·9	19·4	
Gertie	Shorthorn	3 June ,,	81	4·1	3·71	Dry, 12-1-00
Spot	,,	17 Oct. ,,	573	4·4	28·2	
Plover	,,	25 April ,,	428	3·9	18·6	
Queenie	,,	20 April ,,	138	4·5	6·95	Dry, 21-1-00
Painter	,,	4 Sept. ,,	743	4·0	33·2	With first calf
Brush	,,	12 Sept. ,,	786	3·8	33·4	,,
Blossom	,,	14 Sept. ,,	675	3·9	29·4	,,
Florrie	,,	15 Sept. ,,	693	3·0	23·1	,,
Kit	,,	16 Sept. ,,	734	3·7	30·4	,,
Frizzy	,,	27 Sept. ,,	618	3·9	26·9	,,
Kate	,,	30 Aug. ,,	451	4·0	20·2	,,
Violet	,,	1 Oct. ,,	642	3·8	27·3	,,
Laurel	Grade Shorthorn	4 Oct. ,,	853	3·7	35·34	
Restless	,, ,,	4 Oct. ,,	814	3·5	31·89	
Rosella	,, ,,	9 Oct. ,,	846	3·3	31·2	
Redmond	,, ,,	6 Oct. ,,	851	3·9	37·15	
Jane	,, ,,	10 Oct. ,,	793	4·0	35·5	
Shelly	,, ,,	13 Oct. ,,	842	3·8	35·8	
Peggy	,, ,,	14 Oct. ,,	502	4·0	22·4	
Stranger	,, ,,	15 Aug. ,,	736	4·1	33·79	
Empress	,, ,,	23 Aug. ,,	711	3·8	30·25	
Mundah	,, ,,	29 Sept. ,,	817	3·5	32·0	
Pokey	,, ,,	26 Sept. ,,	587	3·4	22·34	
Sally	,, ,,	23 Sept. ,,	863	3·5	33·8	
Rose	,, ,,	11 Feb. ,,	146	4·2	6·86	Dry, 17-1-00
Whiteflank	,, ,,	4 June ,,	753	3·8	32·04	
Star	,, ,,	17 Dec., 1898	699	4·3	33·65	
Roany	,, ,,	12 June, 1899	209	3·8	8·87	Dry, 29-1-00
Ranger	,, ,,	9 June ,,	203	4·3	9·7	Dry, 25-1-00
Ginger	,, ,,	17 June ,,	644	4·0	28·85	
Biddy	,, ,,	18 May ,,	749	3·9	32·6	
Bally	,, ,,	12 Oct. ,,	863	3·8	36·72	
Beauty	,, ,,	14 Oct. ,,	843	3·8	35·8	
Leopard	,, ,,	17 Oct. ,,	642	3·7	26·6	
Trial	,, ,,	26 Oct. ,,	996	3·9	43·5	
Duchess	,, ,,	27 Oct. ,,	751	3·7	31·1	

THE DAIRY HERD—*continued.*

RETURNS FROM 1ST TO 31ST JANUARY, 1900—*continued.*

Name of Cow.	Breed.	Date of Calving.	Yield.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.			
Pet ...	Grade Jersey ...	6 Oct. 1899	555	3·8	23·5	
Podge ...	Grade Shorthorn	1 Nov. ,,	754	4·0	33·77	
Russet ...	,, ,, ...	10 Nov. ,,	718	3·8	30·5	
Rusty ...	,, ,, ...	17 Jan., 1900	355	3·1	12·32	
Alice ...	,, ,, ...	13 Nov. 1899	879	3·8	37·4	
Daisy ...	,, ,, ...	21 Nov. ,,	952	3·9	41·57	
Nell ...	,, ,, ...	1 Dec. ,,	662	3·2	23·72	
Damsel ...	Holstein ...	5 Dec. ,,	967	3·0	32·49	With first calf

Continuing our notices of the College herd, we now present illustrations of two Ayrshire cows and of a fine Shorthorn bull, with their pedigrees and the milking performances of the former.

LEESOME OF GLEN ELGIN (Ayrshire).

Colour, brown and white.

Calved, 20th June, 1895.

Sire—Gordon.

Dam—Leda.

Dam—Leda (486, A.H.B. of A.), by Ettric of Oakbank (34, A.H.B. of A.) For further pedigree, *see* pedigree of Laverock of Glen Elgin.

LEESOME OF GLEN ELGIN.

Name of Cow.	Date.	Milk.	Test.	Butter.	Remarks.
	1899.	Lb.		Lb.	
Leesome of Glen Elgin	October	613	3·4	23·34	Nineteen days' milk.
	November... ...	881	3·3	32·55	
	December	785	3·4	29·89	
	1900.				
	January	985	3·8	41·92	Still in milk.

ANNIE LAURIE OF GLEN ELGIN 4TH (Ayrshire cow).

Colour, white and brown.

Calved, 16th July, 1894.

Sire—Gordon (No. 38, A.H.B. of A.)

Dam—Annie Laurie II. of Oakbank (1, A.H.B. of A.)

Gordon was bred by Messrs McNab and Bros., Oakbank, Tullamarine. Sire—Ada's Earl of Oakbank.

Gordon was awarded following prizes:—1st prize, Ballarat, 1890, as one-year-old, beating in his class Alsa Craig, who was champion at the Royal Agricultural Society's Show, Melbourne, 1891; 1st prize and champion, Bacchus Marsh, 1892; 1st prize, Kyneton, 1893; 1st prize, champion prize of Australasia, and Herd Book of Australasia prize, Royal Agricultural Society's Show, Melbourne, 1893; 1st prize, and champion prize, Bacchus Marsh, 1896.

Gordon is the sire of the champion Ayrshire cow, Royal Agricultural Society's Show, 1896, and also champion dairy cow; winner of Lord Brassey's Gold Medal, same show, and many other prize-winners. His sire, Ada's Earl

of Oakbank, won 1st prize at National Agricultural Society's Show, Melbourne, 1887, as a one-year-old; 1st and champion, Bacchus Marsh, 1887; 1st in his class, champion and centennial prize at National and Agricultural Society's Show, Melbourne, 1888; 1st and champion, Bacchus Marsh, 1888; 1st and champion, Grand National, St. Arnaud, 1888; 1st at Ballarat, 1888; 1st at Kyneton, 1888; 1st at West Bourke, 1889; 1st at Heidelberg, 1889; 1st as aged bull at Melbourne, 1889, and champion as best bull; and was afterwards sold for 150 guineas by auction. He is by Duke of Randwick (342, A.H.B., and 28, A.H.B. of A.); dam, Ada of Drumlanrig (617, A.H.B.)

Dam—Annie Laurie 2nd of Oakbank (1, A.H.B. of A.), by Duke of Barbiston 21st (26, A.H.B. of A.) Annie Laurie 2nd of Oakbank was awarded 2 prizes at Royal Show, Melbourne, in 1888 and 1889; 1st at Bacchus Marsh, 1888 and 1889; 1st at Kyneton, 1888; 1st in the open dairy cow class (in milk) at Bacchus Marsh, 1891 and 1892; 2nd prize at Royal Agricultural Society's Show, Melbourne, as a dairy cow, 1892; 1st prize as one of a group of dairy cows at Kyneton, 1892; and 2nd prize as one of a pair of dairy cows, Bacchus Marsh, 1896. Annie Laurie 2nd is the dam of Glen Elgin's Bruce, who has thrice won the grand champion prize of Australia and Herd Book prize. 21st Duke of Barbiston (1300, A.H.B., and 26, A.H.B. of A.), bred by late Mr. Richard Gibson; sire, Duke of Randwick (imported—342, A.H.B.); dam, Clementine (2516, A.H.B.), by Butterfly, &c. 21st Duke of Barbiston awarded 1st prize as a yearling bull at the National Agricultural Society's Show, Melbourne, 1886; 1st prize as a two-year-old in 1887; grand champion prize of Australia as best Ayrshire bull in the yard; and 1st at Bacchus Marsh, 1887.

g d Annie Laurie of Oakbank
g g d Annie Laurie of Oakbank
g g g d Dinah, &c.
g g g g d Katie 2nd, &c.
g g g g g d Katie, &c.
g g g g g g d Molly, &c.
g g g g g g g d Maggie, &c.
g g g g g g g g d Annie, &c.

ANNIE LAURIE OF GLEN ELGIN.

Name of Cow.	Date.	Milk.	Test.	Butter.	Remarks.
	1899.	Lb.		Lb.	
Annie Laurie ...	June	486	3·9	21·22	Nineteen days' milk.
	July	771	3·7	31·94	
	August	763·5	3·7	31·6	
	September... ...	789	3·8	33·75	
	October	786	3·0	26·4	
	November... ...	664	3·2	23·79	
	December	633	3·5	24·8	
	1900.				
	January	382	4·4	18·8	
		5,274·5		212·3	Total for whole milking season.

PEDIGREE OF SHORTHORN BULL—37TH DUKE OF ATHOL.

Colour, red (little white).

Calved, 24th September, 1894.

Bred by Mr. Lawrence Dugdale, Springfield, Myrniong.

Sire—Rugia's Prince 7th, calved 2nd August, 1891; sire, Lord Russell 9th; dam, Rugia Oxford, by Oxford Beau 7th (42082); g d, Rugia Niblett, by Royal Butterfly 20th (25007); g g d, Ruth Niblett, by 2nd Duke of Jamaica (25977); g g g d, Rebecca Niblett, by Cynric (19542); g g g g d, Rachel Niblett, by Nauplius (16607); g g g g g d, Rugia, by British Boy (11206);

Plate CLXXV.

SHORTHORN BULL, "DUKE OF ATHOL."

Plate CLXXVI.

AYRSHIRE COW, "ANNIE LAURIE."

AYRSHIRE COW, "LEESOME."

g g g g g g d, Roxana, by Acteon (14009); g g g g g g g d, Rhoda, by Daedalus (3539); g g g g g g g g g d, Rhene, by Chilo (1825); g g g g g g g g g g d, Rhea, by Nero (1265); g g g g g g g g g g g d, Raspberry, by Harold, jun. (1096); g g g g g g g g g g g d, Strawberry, by Adonis (1612); g g g g g g g g g g g g d, Neesham, by R. Colling's Son of Phenomenon (491); g g g g g g g g g g g g g d, by Punch (531).

Dam—Mountain Maid 13th, by Duke of Richmond.
g d Mountain Maid 12th, by Rosebuds Early.
g g d Mountain Maid 11th, by Rantin Robin.
g g g d Mountain Maid 9th, by Young Fenian.
g g g g d Mountain Maid 4th, by Lord Raglan (47).
g g g g g d Mountain Maid 2nd, by Major Nelson (49).
g g g g g g d Mountain Maid, by Museum (54).

WHY DANISH BUTTER BEATS BRITISH.

By JAMES LONG,
In the *Agricultural Gazette*, Tasmania.

It might be possible to answer the above question by replying that Danish butter occupies our home markets in place of our own butter because the farmers of Denmark produce it at less expense, but the object we have in view is to show how they are enabled to ship their produce to this country at a remunerative price, and to undersell us. As will be seen in the following remarks, their success is largely owing to education, to the perfection of a practical system both of production and sale, and to the national form of combination. It is well to remark at the outset that there are no expensive agricultural or dairy schools in Denmark, no high salaries paid to officials or instructors, and no large grants made by the Government. As a matter of fact, the technical education grant made to an important English county is, I believe, considerably larger than the whole grant made on behalf of Danish dairy farming, if, indeed, it would not cover the entire grant made on behalf of agriculture. There are special allowances made by the Government for the purpose of helping dairymen and dairywomen to learn their business. In addition to the agricultural schools the Poultry Farming Society receives a grant with the object of improving the poultry industry, while a sum of no less than £17,000 is annually paid for prizes for the encouragement of the improvement of Danish live stock and of the agricultural institutions of the country. There are, too, certain experts who are retained and paid some £4,000 a year to advise the farmers, in addition to which there are others in the service of the Royal Agricultural Society. Some support is given to a few credit institutions and agricultural land banks, and lastly the railway system of Denmark, being under State control, all milk and butter is sent by passenger train at goods rates, while stock foods and manures are charged for conveyance at the lowest possible figure. These facts are quoted with the object of showing that a great deal is done by the Danish Government in the interests of agriculture, which really means the support of butter production, for practically speaking every farmer in the country is a producer of butter.

Although the Danish system as it is conducted to-day had not been so fully developed on my first visit of investigation fourteen years ago, it was in force and was a marked success, but at that time we had not a single dairy school in England, we had no recognised system of butter-making, and not a single expert who could answer certain questions, thoroughly understood in Denmark, but to which I endeavoured to obtain replies. Three or four years later there was no one qualified person to be found for the position of teacher of Cheddar cheese-making during the summer season in Scotland, and for whom a liberal salary was offered. I made the same remark in a report to the Highland Society of Scotland upon education in dairy farming in Europe and America in

the year 1888, having been applied to to recommend such a person. It will, therefore, be seen that the Danes had a very considerable start of us in England, and that, although our own system of technical education has done, and is still doing, a great deal, they are working upon other lines of a national character which are ignored in this country as almost everything is ignored which involves the assistance of the farmer by Government.

When we say that every Danish farmer is a butter-maker, we provide one of the keys to the solution of the reason why they are so willing to co-operate and to abide by the regulations of the Government. In 1883 the system of cold setting of milk was almost national; at the present time the whole of the milk is separated and either sent to co-operative dairies or to the dairies of very large farmers, who purchase it and utilise it in the manufacture of butter. To speak in general terms, no two farmers work upon different principles, unless they follow the regulations which are laid down by the dairy experts, or, what amounts to the same thing, they produce upon the system which they have been taught at the dairy schools or the dairy farms to which they were sent by the State, so that there is no difficulty in obtaining consignments from given groups of farmers which are practically of identical or almost identical quality. The cows are chiefly of the same breed, the crops grown for their consumption are almost identical, for an enormous area of arable land is used in the growth of stock foods. The artificial rations provided for winter are as near as possible the same, and the foods excluded under the advice of the experts are also excluded by the regulations of the creameries. Cleanliness is not simply demanded, but is enforced by the same regulations; there is no hurry in the early morning to get the milk off by train as in this country; time is allowed for the careful cleaning and feeding of the cattle, and the conditions of farm life are quite opposed to those which exist on the majority of English dairy farms. The cream after separation is cooled—a most necessary plan—and ripened. In many cases the ripening is the result of the addition of a "starter," which may be prepared from cultivated bacteria or by simply adding a portion of butter-milk from a previous churning.

There are in Denmark about 1,200 co-operative creameries which are practically owned by the farmers who have united to build them; the committee purchases the milk by weight, and very often in accordance with its fat percentage as well. The regulations vary in some slight degree, but they are based upon certain lines which may be referred to as follows:—The payment upon entrance as a member of so much per cow, being the number of cows milked by each farmer, who is required to give notice—usually three months—of his intention to withdraw. Every farmer supplying milk must take back the butter-milk and separated milk at a price which is fixed periodically; not unfrequently this is about the hundredth part of a shilling per pound. After the payment of loans obtained for the starting of creameries and making certain provisions which are of importance, the profits remaining are divided among the shareholders, who receive a percentage upon each share they possess or in some other satisfactory manner. In England the farmer is usually required to convey his milk to the factory or creamery; in Denmark the milk is fetched subject to the condition that in certain cases small quantities of milk are required to be delivered upon the high-road along which the collecting cart passes. The farms are periodically inspected and fines inflicted if the conditions are not perfect and thorough cleanliness observed. The feeding is regulated, such foods as turnips, and even peas, beans, and vetches, being forbidden, whereas rape cake, which is extremely cheap and not particularly palatable to the cattle, is recommended, its use being sometimes insisted upon under the belief that it adds to the flavour or aroma of the butter. Bad feeding subjects the farmer to a fine. It is worthy of remark that in every co-operative society the members are enabled to obtain all purchased manures at low rates, the committee buying large quantities for their use, so that the co-operative system includes purchase as well as the sale of the produce of the farm. Should disease break out in the dairy or in the family of the farmer, certain measures must be

immediately taken under the penalty of severe fines, and steps are taken, not merely to inflict the penalties when they have been earned, but to prevent the possibility of the regulations being broken. One of the most important of all matters connected with the Danish creamery system is the provision of competent managers; that has been a great difficulty in this country, as in Ireland, but it is overcome in Denmark, inasmuch as so many persons are trained to the work—which is really the life work of every farmer—that there are always both competent and eligible candidates.

We have seen that the production of butter in Denmark is, and has been, the first consideration. We do not refer to the mere manufacture of large quantities, regardless of any other feature, but to the production of an article of high quality, made to satisfy the requirements of British consumers, who, in consequence of such satisfaction, have become permanent customers. The system is the result of thoroughly educating the farming community, but it must not be supposed that their education is complete. It is, it is true, complete so far as it goes, but the scientific advisers of the Danish people are engaged in systematic investigation which is responsible for a great deal of the knowledge which has been gained, and which is continually bringing to light new facts which are communicated to the farmers, and which enable them to improve the flavour and general keeping quality of their butter. We would therefore add that the scientific investigation is playing an important part in the success of Danish farming.

Now we come to a feature of quite another colour. Years ago the Danish farmer sold his butter to Danish merchants, who in their turn consigned it to English agents for sale to the trade, usually the wholesale trade. Now, the butter from Denmark goes direct—in the great majority of cases through an organisation which has been formed by the farmers themselves—to the English trader, thus avoiding the Danish merchant on the one hand and the English agent on the other, and consequently saving the intermediate profits. Had such saving not been effected, the Danish farmer would have remained in a still worse condition than before, and have been less able to compete against the enormous supplies which arrive from the Antipodes. Before despatch, Danish butter is graded, and consequently each consignment is of one quality realising one price. This practice, again, is important and remunerative, inasmuch as when the consignment of casks was of a mixed character the value was fixed in accordance with the market value of the inferior casks than of those which were of superior quality. An English buyer is now in a position to learn by telegraph and to order by wire, through the Associated Dairy Organisation of the country, exactly what he wants for his next week's trade, and on receipt of his wire the butter is immediately despatched, arriving in almost as perfect condition as when it left the farms of those who produced it. Here we have in another form a principle which has been adopted by many of the blending-houses of Normandy and Brittany. In these provinces of France butter is bought in the open market, graded on its arrival at the factory, and then blended in accordance with its quality, the mixed butter being immediately despatched to England. The Danes do not blend, and perhaps it is for this reason, among others, that their butter keeps better. The permanent butter show in Copenhagen costs the Government about £1,500 per annum. Farmers who desire to compete receive their orders by wire to despatch butter which is already made. It is judged at the commencement and at the end of the fourteen days during which it is exhibited, and its keeping quality, as well as its flavour, is further tested, so that the authorities know who are the best makers, and are therefore in a position to determine where to send the numerous students whom they advise and assist in their education. The farmers who exhibit are required to send full data as to the feeding and management of their cattle, while the Government pays for the butter they send at market price.

Lastly, there are a certain number of consulting experts who advise farmers in all that concerns their work; these men are thoroughly experienced, and cost the farmer only their railway fare and a small sum for subsistence,

unless they are put up at the farm. Every difficulty is in this way removed and every fault corrected. It is well known that an expert—Mr. Faber—also resides in this country and devotes his time to the promotion of the interest of the Danish butter trade, which indeed he does right well. If we add to the above remarks the statement that the Danish margarine law has been a most satisfactory safeguard against the fraudulent sale of Danish butter, we shall complete a fairly clear and practical list of the means by which the Danish farmer maintains his position in the British market.

LONDON DAIRY SHOW.

A SPECIAL correspondent of the *Glasgow Herald*, writing of the London Dairy Show, says:—To west of Scotland farmers perhaps the most satisfactory feature of the dairy show held in the Agricultural Hall, London, last October, was the success of the Ayrshire breed in milking trials. The Ayrshire is noted for milk-producing qualities, and no breed is better suited for cheese-making purposes. But even with the reputation they have it is no mean feat for a member of the breed to give an average daily yield of 64·4 lb. of milk during the two days which the trials were spread over. This is nearly six and a-half gallons, and was the largest of the show. On points, however, this was beaten by an Ayrshire shorthorn cross, which, though giving rather more than a pound less per day, gave milk of better quality, and so gained the championship prize with 135·7 points to the pure-bred's 129·8, which, however, was second best. This may be some solace to northren exhibitors for their want of success in the cheese classes.—*Ayr Advertiser.*

PIGS AND THEIR MANAGEMENT.—No. 4.

WEIGHT OF SOWS AND PIGS AT BIRTH.

SOME interesting competitions have lately been made with the object of putting on record data concerning the weights of sows before and after farrowing, weight of the afterbirth, and weight of each pig at birth. The sows on which observations were made were ten in number, and were pure-bred Poland-Chinas and Berkshires, crosses of these breeds, or cross-bred Poland-China-Chester Whites. They ranged in age from 1 to 4 years, and in weight from 240 lb. to 577 lb. The average weight before farrowing was 382·1 lb.; after farrowing, 359 lb. The average weight of the afterbirth was 4·01 lb. The litters averaged 16·7 lb. each. The individual pigs ranged in weight from 1·3 lb. to 3·1 lb., the average being 2·2 lb. There were from five to twelve pigs in a litter, and in general the individual pigs in large litters were somewhat smaller than those in small litters.

In a litter of pigs there is often one much weaker than the others. This is often called the runt, or teatman. It is frequently spoken of as the last pig farrowed, this occurrence being supposed to cause inferiority. This idea was not borne out by the facts observed. The first pig born in one of the lots weighed 2·1 lb., and the last 2·6 lb. In other cases the pig farrowed last weighed less than the one farrowed first. In this matter, however, no regularity was observed, and it is stated that no weakness or other inferiority was observed in the last pig farrowed.

WEANING PIGS.

RINGING AND ROOTING.

A common practice has been to allow the pigs to suckle until they are six weeks old. Then they are suddenly weaned, and one or two pigs are left to keep the sow's udder from inflammation. That course has a tendency to stunt the pigs which are taken away, and when a pig is once stunted in its growth it hardly ever recovers what it lost. A pig should be left to suck not less than

eight weeks. They should have learned to eat with their mother. By throwing a handful of oats on a clean place on the floor, when the pigs are three weeks old, they will begin to pick them up. Then there should be a low and shallow trough from which they can obtain skim milk mixed with shorts or mixed with a small quantity of ground grain. If the young pigs can be turned out with their mother on a clover field before they are weaned, they will learn to eat it rapidly. They should be given a chance to take plenty of exercise. From the time the pigs are weaned a moderate supply of skim milk, buttermilk, green clover, or similar feed will promote the growth of muscles which become lean flesh.

Want of exercise and want of flesh-producing food during that period of their growth will prevent any breed of hogs from developing the fleshy qualities which are wanted in the bacon and hams. It is improbable that any kind of feed during the fattening of the animals can result in producing a large proportion of lean flesh unless the animals are well and regularly fed.

The following opinion on weaning pigs is given by Professor Henry, of Wisconsin:—Pigs are generally weaned when from seven to ten weeks old. This is best accomplished by first removing the two strongest members of the litter to a separate pen, and after two or three days taking away others, always choosing the most vigorous, until all are removed. Under this practice the milk flow of the dam will gradually diminish until it ceases. Many breeders allow pigs to wean themselves—a result reached without difficulty where they are liberally supplied with palatable nourishment at a side trough. When the pigs are weaned they should be placed in groups of not over twenty, care being taken that the members in each group are of the same size. Where large numbers of pigs of varying sizes range together, the weaker ones are at a disadvantage at the feed trough, and are liable to permanent injury from lack of feed and the rough treatment they receive.

The weaning process should be very gradual. The sow should now be provided with a suitable place for caring for her pigs when they have arrived safely, and this may be expected if the sow is in good health and comfortably housed. The feeding cannot be too good. The milk of the sow is extremely rich. It contains twice as much casein as cows' milk, and two and a-half times as much mineral matter, but not quite as much fat. It is thus exceedingly well fitted to nourish growing pigs, and this fact explains the rapid growth of the sow's litter, which in one month often increases in weight ten times. But the sow cannot make the milk without food, and the best feeding is required to push the little pigs along and to keep them in good flesh. At the same time the food of the sow should be changed frequently. A mixture of barley-meal, shorts, and skim milk may be fed twice a day, with a feed of soaked maize at noon, and between these meals a few roots will be excellent, and will increase the milk. The roots should be cut up into slices. Some feeders prefer to cook the food, but, apart from any other consideration, the system hardly answers, as the expense and labour of cooking are sufficient to more than counterbalance any extra profit that may be gained. Sour food is to be avoided; it is never wholesome, and is always fed at a loss as compared with sweet food. If milk can be obtained and fed sweet it is very valuable, but no sour food, not even milk, should be given to a brood sow. Feed the sow from a low, shallow trough, and the little pigs will soon learn to taste the food. As soon as the little pigs have learned to eat, make a little pen for them, and provide a small, shallow trough. At first, give a small quantity of rich food, such as sweet milk, with a small quantity of shorts or barley-meal. Never give so much that a large quantity will be left in the trough to sour, as sour milk is injurious to young pigs. Continue to increase the quantity as they learn to eat and require more. In a short time the pigs will have learned to eat, and will come as regularly for their food as the sow, and they will gradually become adapted to the food, drawing less and less on the sow, till by the time they are eight weeks old they can be separated from the sow, without checking the growth of the pigs in the least. The sow will also be in good health and vigour, ready for breeding again. Of course, the season must be reversed for Australia.

FEEDING THE PIG.

FEEDING THE PIG FOR PORK.

What is a complete food for the pig, and will it pay to feed some wheat even when wheat is pretty high in price? If wheat is fed with cornmeal, the results are highly satisfactory. Bran, because of its character of composition, is not a wholly desirable feed for pigs. Middlings may be fed with profit at any time during the hog's life. They are not only rich in protein and ash, but are what may be called a clean, smooth food, being free from the objectionable crude fibre which so prominently distinguishes bran. Barley is an excellent food, and will enable such sections as Northern Dakota and Montana to produce some of the best pork in the world. In these and other sections like them, barley and peas will make pork production profitable, if given the opportunity. Peas, as all understand, are a highly nitrogenous food, and when dry should always be fed with some other grain.

There are some who do not appreciate the value of clover hay for swine. It is to be regretted that such appreciation is not universal. It is not only valuable because of its high merit as a feed, but because of the bulk it furnishes. No growing animal should be fed exclusively upon the grains. Swine will eat dry clover hay with a relish, but the better way to feed it is to cut it up, steam it or pour hot water on it, and mix with meal. Pasture, if it is the right kind of pasture, is nearly an essential in profitable swine-raising. It should be clover pasture; but if it is not, it must be composed of short and tender grass.

FEEDING THE BROOD SOW.

In the paper on this subject in the *Live Stock Journal* of 3rd November (says a well-known Australian breeder), which is taken from an American source, advice is tendered which my own past experience would make me very careful not to take. In the first place, mangels are recommended to feed the in-pig sow on, while I have known numerous cases where these roots, excellent food as they may be at other times, have acted in the most deleterious manner upon the unborn litter, which, though born alive, have all died within an hour or two after birth, and this has occurred both in my own herd and in that of others I have known. Then there is the recommendation to supply the young pigs at a fortnight old with new milk so as to assist their mother to rear them. Now, a cow's new milk with just a small portion of sugar and a drop or two of oil—cod liver for choice—will rear a young pig deprived of its dam, and often the pigs so fed grow faster than those left to the care of the sow, but a mixture of food composed of two kinds of milk is always bad. In pigs, when very young, it is almost invariably followed by acute diarrhœa, and it is a well-known fact that, however, well either pigs or children will do upon cow's milk alone when judiciously given, they never thrive so well when it is given as an adjunct to their mother's milk. A little corn, such as crushed oats, and, later, crushed Indian corn, is the best food for young sucking pigs till they begin to eat with their dam, when, if her food is of a milky nature, they may take it without harm. The advantages of letting sows, especially Berkshire and kindred breeds, run out to grass, is well worth remembering as an excellent practice.

FEED ON RIGHT LINES.

It is not enough to select well. Feeding is as important as selection. No matter how good the stock may be, if the young sows are not fed all they want to eat from birth until farrowing time, they will be poor milkers. It is impossible to develop a roomy sow with milking capacity without feeding largely on albuminous foods. The proper frame, bone, and form can be developed on good pasture combined with foods in which oats, bran, and milk are predominant, with plenty of exercise for muscular development, and they can be obtained in their highest form in no other way. The short, compact brood sow, pretty as a picture, is not the one to yield a profit in the breeding herd. Plenty of rich food will develop her beauty, because it will develop her fat; but fat and a high degree of fruitfulness or fecundity are incompatible.

All through the summer the pigs can be fed slops to good advantage, but it should be kept clean and sweet.

Food must be selected for specific results. No breed can convert fattening food into juicy, lean meat. No animal when fed an excess of fat-formers can change part of those into bone-builders and muscle-makers. Do not stint the feed of your breeding herd to avoid fat, but choose such foods as are rich in flesh-formers, bone, muscle and nerve materials, and use sparingly starchy foods, such as have a tendency to produce too much fat. There is a great difference between flesh and fat.

The *Farmer's Gazette* publishes the following notes on feeding pigs:—Pigs should be well but not overfed. A good bacon pig of 12 stone ought to be produced in seven months from its birth. It should not be crammed, neither should it be half-starved, but fed steadily and regularly. Pigs fed steadily and regularly will give the most satisfactory results to the feeder when weighed in the factories. A hog which has been half-starved at any period of his life, even though well fed afterwards, will not do so. Feed three times a day at fixed hours; never leave food in the troughs after the pigs have finished. The flesh of hogs is soft and flabby if fed on brewery or distillery stuff, or on turnips or mangels, and in comparison to their size their weight in the scale is miserable. They may deceive (we doubt it) the buyer who buys by "guess," but they will not deceive the scale-weight.

The best classes of food for pig-feeding are:—Potatoes (cooked), milk, barley-meal, oatmeal, crushed oats, pollard, bran, ground wheat, ryemeal, Indian corn. The latter should be only used sparingly and in conjunction with other foods, such as pollard, bran, or milk; and should always be ground as fine as the mill can make it, and thoroughly cooked, otherwise the Indian corn passes through the animal undigested, and to the loss of the feeder. Barley-meal need not necessarily be cooked—scalding it will do. It is certainly the best food, except perhaps potatoes, for producing pork. Never sell barley of moderate quality to buy Indian meal. Grind your barley, feed it to your hogs and their weight when dead will astonish you.

The secret of making money by pigs is not to rush into them, nor out of them. Never keep too many; never keep too few. The fault in the past has been that feeders ran in to buy when hogs were dear, and stayed at home when they were cheap.

You will not get well-shaped pigs from a badly shaped boar; neither will you get thrifty pigs from an unthrifty sow. If you do not keep your pigs clean and dry, they will not pay you. A pig, any more than a human being, will not thrive on a foul, damp bed. The best thriving pigs we have ever seen were those produced from an ordinary well-shaped country sow and a thoroughbred York boar. The services of this latter class of animal can easily be had nowadays. A long-legged, ungainly boar will get a leggy, flat-ribbed, cat-hammed, herring-gutted, miserable class of pig, which will pay nobody, and deceive nobody as to their quality, except perhaps the man who feeds them. The tall, leggy hog was ignorantly thought to deceive the buyer who purchases by "guess," but does not deceive the factory weighmaster.

No matter how low prices may be, if it does not pay to feed pigs it certainly does not pay to starve them. If you cannot afford to keep a breeding sow yourself, get two or three of your neighbours to join you, and divide the expense and the progeny. A good sow is easily fed, and is the best savings bank you can have. The day you buy is the day you sell. If you pay too much for the store you will want (but will not get) too much for the bacon pig. Where a proper sow is kept, young pigs can be produced for 1s. a week of their age—that is to say, eight weeks, 8s.; ten weeks, 10s.; and so on, up to twelve weeks. Why should the feeder pay practically double this for? One great secret of pig-raising is: When the pigs are high in price, do not lose your head and throw your money away; when pigs are low, do not lose your head and throw your pigs away.

CHARCOAL AND ASHES.

Unquestionably charcoal is a valuable hygienic agent for pigs. It is a corrective, and certainly prevents some diseases arising from disordered digestive functions. Wood ashes act similarly, or at least minister to similar wants. Both charcoal and ashes are freely used by the leading American swinegrowers.

There is no need to fix quantities. The best way is to keep both substances within reach of the pigs, and allow them to consult their own tastes and needs. If you use commercial charcoal, throw out half a sack at a time in a clean, dry corner, and supply more when used up. All the wood ashes from the kitchen fires can be used in the same way. If you have waste wood or rubbish burn it in the big paddock, and wet it down before entirely consumed, and the pigs will take care of it.

ARTICHOKES.

One of the very best crops a farmer can grow is the artichoke. It is splendid pig feed. It is easy to grow. From 500 to 1,000 bushels per acre have been grown. The pigs will harvest it. Once planted, it is there for life. Every man owning a farm ought to have his artichoke patch. Strange, indeed, it is so little known, and so few farmers avail themselves of this valuable aid to cheap bacon.

The Jerusalem artichoke is the best variety. It is a plant growing 5 or 6 feet high, resembling hemp. The tubers grow about the roots, and resemble knotty Irish potatoes. Many people are fond of eating them green. They make a fine pickle, but their chief value is pig feed. Select your patch on deep, rich, friable land; fence it with "pig-proof" fence.

The best way to make this fence is to put a stout wire netting, pig fencing, next to the ground; 18 inches to 22 inches wide will do; then above it two barb wires. This will make a cheap fence, and is the only sensible pig-proof fence I know of.

Having fenced in your patch, break it up, harrow finely, and lay off in rows 3½ feet apart. Cut up the tubers, and plant about every 18 inches in the drill, cover shallow, and cultivate as you would maize. They grow all summer, and must be gathered late in the autumn. Plough them up, and gather as you would Irish potatoes; but they are far easier to keep than any potato. But it is a waste of time to gather them. Plough two or three furrows across the rows with a double shovel, and turn in your pigs; they will gather what they want, and will laugh and grow fat while doing it.

When pigs are taken off of any root crop, I care not what—even peanuts—they should be fed two or three weeks on grain. It will improve the bacon, making the fat harder and firmer, and also improve the lard. Pigs may root this patch all winter, yet there will be seed enough to re-set it next year.

When the pigs are taken off, plough the ground, harrow it down level, and in the early spring there will spring up a bountiful crop of young plants. If all are left to grow, the ground will be overcrowded and the tubers will be small, and in a few years will be a mere patch of artichokes. When the plants are a few inches high, plough them out into rows 3½ feet apart; thin them out with a hoe to a stand, one stalk every 18 inches, and cultivate. If this course is pursued, the artichokes will always be good. The rooting of the pigs will be a splendid autumn ploughing for them, and opens up the ground. Their droppings will keep it well manured, and the incorporating in the soil its annual crop of weeds and leaves will keep the soil rich and in fine, loose condition.

GRAZING PIGS.

WHY THE SYSTEM SHOULD BE EXTENDED.

The method of management of pigs in the New World—*i.e.*, the States and Canada—is, from the information contained in their agricultural Press, quite different to the general custom at home. It appears to differ more particularly in respect to the method of rearing pigs and feeding the sow. There, the almost universal system is to graze pigs as we do our sheep and

bullocks. An example of this method has recently appeared in the *Country Gentleman*, wherein a correspondent sets out a system of rotation of crops over a given area in order to provide sustenance for a certain number of sows and their offspring. The crops recommended to be grown are corn, maize, rye, and rape, vetches with clover sown in them, and clover—the latter three crops to be grazed, and the former to be used both in its green state and as corn during winter. Then, again, in other publications, where results of experiments have been given, one can learn that the system of grazing pigs is not only satisfactory, but also successful from the financial point of view.

If a practice of this kind has been so tested and tried, as has been the case in Canada and the States, why should it not be adopted here? Probably the reason most pig-men would give is that no one has ever done so on a large scale. Granted; but has it been tried to any extent? To feed off a field of rape, or vetches, or clover, with pigs may appear a novel idea, but why? The manure left by the pigs would be of great value, the crop would be consumed to the best possible advantage, and its product in the shape of pork would be sold at a rate quite equal to, if not in excess, of that which would have been produced by the feeding off the crop with sheep.

Another great advantage of this method of pork-production is that the sows and their pigs would be kept perfectly healthy, and be reared up in a far more natural way than when too much confined to styes.

SKIM MILK.

RESULTS OF EXPERIMENTS.

Says an agricultural bulletin:—Skim milk should always be used when it is available. It is not only a good flesh-producer in itself, but it also makes the ordinary grain feeds more digestible, and so adds greatly to their value. While skim milk alone is rarely profitable—from 20 lb. to 40 lb. being required to make 1 lb. of meat—when mixed with grain in the proportion of 3 lb. or less of milk to each pound of grain, its value is greatly increased. In a test reported, 1 bushel of maize produced 10 lb. of pork, and 100 lb. of skim milk produced 5 lb. of pork, when fed separately. When fed together, however, the mixture produced 18 lb. of meat, an increase of 3 lb., due to the mixing. In this case 100 lb. of skim milk took the place of 44·8 lb. of maize. If the maize was worth 1s. 0½d. a bushel, the milk was worth 9½d. per 100 lb.; if the maize was worth 1s. 8d., the milk was worth 1s. 3½d. Extended tests in the feeding of skim milk have been made at the Utah Station, and among the facts brought out by the works are these: "The pigs fed on the milk-and-grain ration made much more rapid gains than either those fed on milk alone or on grain alone. The time required to make 100 lb. of gain was 79 days for the pigs fed on milk and grain, 116 days for those fed on grain alone, and 147 days when the feed was milk alone. The milk-and-grain lots required 2·58 lb. of digestible matter, the milk-fed lots 2·85 lb., and the grain-fed lots 3·19 lb. to make 1 lb. of gain in live weight." In this case 10 lb. of skim milk took the place of 23·2 lb. of grain in the mixture. Work at other stations has given very similar results, and has demonstrated that when not more than 4 lb. of skim milk is used with each 1 lb. of grain the milk is worth from 7½d. to 1s. 3d. per 100 lb. The younger and smaller the pigs, the higher is the value of the milk. For full-grown and aged animals it is of less value. Where it is impossible to secure enough skim milk for all the pigs, the available supply should be given to those pigs nearest the weaning age, and to sows suckling pigs.

PEANUTS.

Peanuts are very rich in protein, and so are especially valuable for animals which are growing. Their yield in bushel is less than that of sweet potatoes, but their feeding value per bushel is much greater; and as they are rich in muscle-forming materials while sweet potatoes have their chief value as fat-producers, the two supplement each other. The best variety for grazing is the Spanish, which yields fully as well as others, and its compact growth makes it

easier to cultivate. On soils of medium fertility and with ordinary care a yield of from 50 to 75 bushels per acre may reasonably be expected, and as the hogs do the harvesting the expense of making the crop is much less than for securing an equal amount of food from most other crops. Some recent work at the Alabama Experiment Station shows the high feeding value of peanuts in a very striking manner. Six pigs, with a total weight of 184·3 lb., were used in the test, which lasted six weeks. The peanuts were grown on about one-sixth of an acre, and during the test 373 lb. or a little more than 6½ bushels of corn were fed. At the close of the feeding the pigs had more than doubled in weight, having made a gain of 196·4 lb. Valuing the corn at 40 cents per bushel and the pork at 3 cents per lb., the peanuts, when harvested by the hogs, were worth 18·34 dollars per acre.

The expense of cultivating the peanuts was much less than for cultivating an equal area in cotton, and the thin, sandy soil on which the nuts were grown would not have made more than 200 lb. of lint per acre, while the yield of peanuts was 62·6 bushels per acre. In another test at the same station, peanuts alone, peanuts and cornmeal, and cornmeal alone, were fed to determine their relative pork-producing value. At the close of the sixth week it was found that 2·8 lb. of peanuts alone, or 3·7 lb. of equal weights of peanuts and cornmeal had been consumed for each pound of grain, while 10·7 lb. of cornmeal alone had been needed to make the same growth. On butchering the hogs used in the tests it was found that the peanuts had greatly softened the pork and lowered the melting point of the lard, and that this was not wholly corrected, even when the hogs were fed on corn exclusively for a month before slaughtering. Like other feeds rich in protein, peanuts are more valuable for growing animals than for those intended for immediate killing. The *Bulletin* says further: It is highly desirable to arrange a succession of peanut crops rather than to have large areas ripen at the same time, for, in wet weather, Spanish peanuts will not remain long in the ground after maturity without sprouting.

OUGHT COWS TO BE FED WHILE BEING MILKED?

THIS is a question worth thinking about. The quantity of milk is greatly under the control of the cow. There is reason to believe that even within limits the percentage of butter fat is under the same control, and hence it is a very important question how to persuade the cow to give down the quantity of milk, and of the richest possible to her. We say "persuade," for there is no way possible of forcing her. The point is to concentrate her attention on the one all-important matter of giving a full flow, with the full percentage of butter fat. The above we believe to be a correct statement of the known facts in the case, but there is room for a wide difference of opinion between men and men and cows and cows as to the best method of persuasion.

It is agreed that there is no persuasion in the bootheel or the milkstool applied on the back, nor is there any benefit in using cuss words, although we have heard it said that whistling and the "merry heart that doeth good like a medicine" are potent with the cow while milking is going on Having forgotten how to whistle, we don't know how that is. The point to decide is, Will the cow give her mind to the business of giving down when she has a fine mess of feed before her, or is the attitude of impatient waiting and expectancy the best persuader? We can see at once that if the cow is expecting food and does not get it, she is not likely to keep her mind on the subject of giving down. If, however, she has been accustomed to have an elegant feed as soon as milking is over we would expect her to give due attention and give down as fast as possible. The main thing, it seems to us, is how to get the cow's undivided attention to the supreme work of the moment—that of giving down rich milk and lots of it.

Have our readers ever tested the different methods in a general way, and, if so, what has been the result? Is it really a matter of more importance than it appears to be at first sight? We think it quite true that with the advent of the new milker cows may begin to fail in their milk, both in quantity and in richness. We are quite sure there are some men who would put the cows dry by their bad methods of milking. We can readly see how a bad-tempered man or a profane man might decrease the yield 25 or 30 per cent. The milker must be *en rapport*—that is, in full sympathy with the cow, if she is to do her best at the pail. Now, can that sympathy, that co-operation, that combination of efforts for the accomplishment of a definite purpose be best secured by allowing her to eat while being milked or not? That is the question on which we would like to have the experience and observation of our readers.—*Wallace's Farmer.*

The Horse.

STABLE NOTES.

By W. C. QUINNELL, M.R.C.V.S.

DISEASES OF HORSES.

Erysipelas.

Erysipelas, commonly known as St. Anthony's fire, is a specific febrile disease, due to the presence of a virus—the streptococcus erysipelatous. This disorder is characterised by diffuse inflammation of the skin and subsequent tissues, with an eruption not developed in every case; much pain, swelling, and heat. When occurring in association with an injury it is termed *traumatic*, and when rising spontaneously it is then called *idiopathic*.

Varieties.

1. *Simple* is a rare form, and when seen it is a mild affection.

2. *Phlegmonous form* is the one most frequently met with in the horse. It is very severe and usually an exceptionally fatal type, as it involves the skin, subcutaneous and other tissues.

Symptoms may be divided in (*a*) general and (*b*) local.

(*a*) *General Symptoms.*—The fever is ushered in by a shivering fit, the temperature gradually rises, and there is muscular pain. Digestive disturbance is indicated by the mouth being dry and hot, the tongue coated or furred, the breath has an offensive smell, and the bowels are constipated; accompanied by thirst and depraved appetite.

(*b*) *Local Symptoms of the Simple Form.*—It consists in redness (not easily noticeable in all horses), roughness, and slight swelling of the skin, which, on pressure being applied with the fingers, pits. Formation of vesicles takes place in many cases, and desquamation follows.

(*c*) *Local Symptoms of the Phlegmonous Variety.*—Swellings which pit upon pressure. With the progress of the disease the parts become harder, more brawny, and more painful, and the tension of the skin over the parts is increased. Numerous vesicles, preceded and accompanied by serious discharge, may be developed. They are, when formed, a characteristic feature of erysipelas. In the severer forms the discharge of the vesicles becomes bloody and albuminous.

The inflammatory changes taking place in the subcutaneous tissue may terminate in the formation of pus, and so it is that large portions of skin and tissue may be destroyed. But in cases where the inflammatory process is not excessive, the discharge or effusion is absorbed; consequently the vesicles speedily dry up and form scales, which gradually drop off.

In some cases of a very severe type sloughing of the tissues may spread to the more deeply seated structure, and involve the muscles, ligaments, sometimes even leading to necrosis of bone. In other cases the pus may find its way into the joints, causing their disintegration, and producing constitutional disturbance so serious as to prove fatal. The mucous membrane of the mouth and nose may also become affected. In phlegmonous erysipelas the fever is very severe. The pulse is quick and feeble; the respirations are hurried, and the pain is intense. Erysipelas may be confounded with scarlatina, farcy, and lymphagitis, but by carefully noting the symptoms they are easily distinguished.

Treatment.—The patient should be placed in a well-ventilated loose box; aperients such as small doses of calomel or aloes, or both, may be given, as they usually abate irritation. A few doses of aconite relieve acute febrile symptoms. If the temperature be very high, salicylic acid may be tried in full doses, twice or thrice daily. Salines, such as potassium chlorate, may be dissolved in the water during the acme of the fever. If the thirst be great as the disease progresses, stimulants become necessary to sustain strength, and aromatic spirit of ammonia in doses of 2 oz., or whisky in doses of 3 or 4 oz., may be given three times daily; milk and eggs and beef tea should be given to weakly patients especially, and also quinine.

Local Treatment.—Hot fomentations persevered with for several hours, and affected surfaces subsequently moistened with borax solution and laudanum. If abscesses form they should be opened, so as to allow of the escape of pus, and the parts should be dressed with carbolic solution (1 part in 40), but scarification of phlegmonous swellings is rarely justifiable. Cleanliness, good sanitary surroundings, and generous diet are essential.

THE ZEBROID.

A RIVAL of the mule comes to prominent notice in this country through the last report of the Bureau of Animal Industry of the United States Department of Agriculture. The *Pacific Rural Press* gives the following account of the production of the new breed:—The name "zebroid" seems to have been coined by Baron de Parana, of Brazil, who presents it as the result of his experiments in crossing the common mare with the zebra. The zebra used for this purpose is known as Burchell's zebra (*Equus Burchelli*), which is the best known zebra at this time. It is a species which is still common in some parts of South Africa, and is being used in coach teams in the Transvaal. It differs from the mountain zebra in being larger and stronger, with shorter ears, a larger proportion of white, a longer mane, and more horse-like tail. The general colour is pale yellowish-brown, the stripes being dark-brown or nearly black. The record of this zebra under domestication in the Transvaal seems to be very creditable to it. When hitched up, they stand quite still and wait for the word to go. They pull up when required, and are perfectly amenable to the bridle, and are softer-mouthed than the mule. They never kick, and soon give up their natural inclination to bite when their fear of injury is overcome.

Such is the zebra which is to be the progenitor of an improved mule to be called the zebroid. It seems that the proposition to cross this zebra upon the common horse is not a new idea, nor is the use of the zebra as a substitute for the horse a recent proposition. About seventy-five years ago the beauty and the horse-like behaviour of the species induced the suggestion that only a little skill and patience were required to make the animal available for man's uses. The fact that the zebra is much better adapted by its structure and form to these uses than any of the wild asses led to the belief that the cross with the horse would produce something better than the mule.

There has been some difficulty in securing the cross with the horse, but Baron de Parana has succeeded better than early experimenters, and has produced five zebroids as the offspring of a single zebra male. Three of the zebroids are male and two female. The zebroid Lordello is a brown bay striped with black, and Menelick is a grey striped with black. Others of the five are bay with black stripes and with dark-brown stripes. There appears quite a chance for a play of colours by the use of dams of different shades.

The forms of the zebroids need no comment. Any horseman can learn them for himself. The Baron says that they are very sprightly, but are at the same time gentle, and become very docile with kind handling. They feed as well from the manger as on the pasture, and are possessed of great muscular strength. Their size, slenderness, pace, and disposition depend upon the dam, and they may therefore be bred for heavy or light draft. Crossing upon draft mares gives zebroids large and strong, but not so thick-set as their dams. Crossing with lighter horses gives tall and slender zebroids, which Baron de Parana claims are fully as strong as the horse, but more tractable and suitable for work which requires quickness rather than strength alone. The Baron is convinced that the zebroid will prove of great economic importance, especially in the warmer climates, and he believes that the zebroid will displace the mule—in fact, will be the mule of the 20th century.

Many have been the services of the mule to mankind. Both in war and in peace the mule is the motive power of very important enterprises. He does not figure largely in parade and display; but when it comes to be a question of steady going, persistent and intelligent effort, and unyielding endurance, the mule has stood for generations without a rival. It seems poetic injustice that a servant of mankind, having undergone such labours and achieved such successes, should have to brook a rival at this late day; but why indeed should the mule escape the hardships which the demon of change inflicts even upon mankind? Doubtless the mule will not murmur, although he is a kicker.

HORSES IN SOUTH AFRICA.

Whilst we all are anxious for the comfort and well-being of our fellow-colonists who have so patriotically given their services to the British Empire, we are apt to overlook one matter on which possibly the very lives of our soldiers will depend. We allude to the horses and the care of these invaluable animals. The stupendous work which has to be performed by them in the operations of war is scarcely realised by those who "sit at home at ease," unless it is by reading the war news, describing tremendous long marches on horses, both saddle and harness, working hard from sixteen to twenty hours at a stretch, with scarcely a moment for rest, food, or drink. Small wonder that great losses from causes other than shell and bullet are to be expected. Opportunely, a correspondent writing to the *Agricultural Gazette* (London) says:—

When we consider that a horse soon eats more than his own weight of hay and oats, the provision for him is simply vast, and beyond the comprehension of the average civilian, unless he has dealings with quartermasters or enjoyed the doubtful benefit of a contract to supply forage to a great camp. There is not the necessary forage in Cape Colony when the animals have been imported, and cargoes of grain have been arriving from many ports. The difficulty of supporting an army in the field has been experienced by the Boers, although operating from near the base of supplies and among a population too friendly from a British point of view. The captured horses in most cases were in wretched condition, and much overweighted, as they are mere ponies averaging something like 14 hands, and carrying, for the most part, fine-grown men with, of course, some amount of kit. They are the hardy Basuto ponies which

we would have seen here performing on polo grounds but for the fact that they fetch high figures in their own country. Horse-breeding, however, in South Africa will never be a very promising business unless a prophylactic can be found for the horse sickness which carries off a horse in a few hours.

The Government has issued a pamphlet of directions to those concerned in the duties of caring for the animals, and such experienced South African officers as Major Nunn, F.R.C.V.S., have lent their valuable assistance in its compilation. This gentleman, among other fellow-students of the writer, was sent out to the Cape to investigate the horse sickness, and laid the foundations of these investigations, which, it is hoped, will shortly bring forth fruit in a reliable "vaccine" by which horses shall be artificially "salted."

FOODS.

It may interest readers who have not been in South Africa to learn that hay—meadow or clover—is not a general horse food, but that oats, cut when not quite ripe and chaffed, or fed long, with the straw as cut, takes its place, and is known as "forage," while what we know as maize or Indian corn is called mealies, and is the corn ration served to horses and mules. Barley is also cut green when in ear, but is not at all a general crop, and commissariat officers are warned against it as being disposed to induce colic and fever in the feet. The Government ration is 12 lb. of grain for horses, or of "forage" 10 lb. and grain 8 lb.; mules having to content themselves with 10 lb. of grain or 20 lb. of "forage," or else dividing the weight of grain and forage equally. The alternatives are given in this way because horses and mules in camps, as at De Aar, where mountains of forage are accumulated as forts, can, of course, have bulk, as well as time to eat it, but the grain ration can be carried in the nose-bag of the trooper. It is the custom at home in peace times for each trooper to carry his ration of clear corn in his nose-bag, and is a part of that inevitable weight with which both horse and foot are encumbered. The instructions given to officers are that the mixed ration should be divided into four feeds daily, but the exigencies of the service compel all sorts of departures from the prescribed rules.

Bran, when it can be got, is recommended twice a week, and the mash is to be made by pouring boiling water slowly into a clean bucket in which the bran has already been put, and finally covering it over with a rug for ten minutes to allow the steam to act on the bran. This latter recommendation is one we might more often insist on at home, as much of the fragrance of a mash is lost by not covering it up, and many readers will have noticed how indifferent some horses are to a mash. When ill, and sloppy food is desirable, these horses have a worse chance of recovery, as they cannot, perhaps, eat what they would like, and will not take what is best for them (a common trouble with sick bipeds).

POISONOUS HERBAGE.

Horses in their native country, and, indeed, all animals, have an instinctive aversion to poisonous plants, but, taken 6,000 miles from home, are liable to fall victims to strange herbage, and it is here that we may expect to lose a good many, apart from the fatal disease known as horse sickness. There is an appetising-looking plant which grows in the marshes and borders of rivers in South Africa, which the Boers call tulip, and gives horses a violent form of colic, in which they swell up to a great size in a short time, and, if not relieved, die like a blown bullock on clover. If the vet. is available, with his case of field instruments, he will puncture the gut with a small instrument of the pattern readers may have seen employed in cases of hoven at home, and give instant relief by the outrush of gases through the cannula or pipe.

The instructions referred to in the pamphlet are not, of course, for veterinary officers, but any man in authority, and it is recommended for cases of tulip-poisoning to give a dose of ammonia carbonate, a very good thing to use at home, by the way, as its action is to break up the wind, and act as a stimulant upon the over-distended organs.

The native remedy is a handful of burnt grass; not a bad one either, and one that was once fashionable in England for human dyspeptics, in the more elegant form of charcoal biscuits. Charcoal has a great power of absorption, and is not sufficiently used in veterinary medicine, for no other reason than that it has been pushed aside by new remedies.

HINTS FOR HOME DOCTORING.

This pamphlet is such an eminently practical one that we may well borrow a few hints from it for home doctoring. For instance, when in our correspondence column a dram of some drug is recommended, the stockkeeper resorts to the nearest chemist to weigh it, as he will not be likely to possess apothecary's weights and scales himself, and so spends time and money, which might be saved, by adopting the coinage of the realm as his weights upon the dairy scales (if they are as well balanced as they should be). One British sovereign is about equal to 2 drams, a florin 3 drams, a half-crown $3\frac{1}{2}$ drams, and a three-penny piece (not a coin loved of farmers) is about equal to 1 scruple or 20 grains. It may be stated here (on our own authority) that exactness in doses for animals in not imperative; it is the selection of the remedy, after the diagnosis of the disease, which is important, not a question of a few grains, in any but the most active poisons, and these the amateur would not, of course, attempt to dispense for himself. As an example, it was advised last week to give a dram of sulphate of copper, a dram of sulphate of zinc, and so on, but the range within which such drugs are safe is considerable, and a difference either way of 10 or 15 grains would not materially affect the result. The intelligent reader will see that in his pocket he has practically all the weights he requires, as the 2 drams represented by the sovereign can be divided into equal parts when he wants 1 dram, and so on. It may be mentioned here that one of the ways in which dispensers of extremely active drugs get over the difficulty of weighing out minute doses is to weigh, say, a grain of strychnine and mix it with 20 grains of starch powder or other innocent flour, and then weigh out a grain of the mixture, if a twentieth part of a grain only is wanted.

FLUID MEASURES.

Fluid measure is also provided for in a similar manner by calling attention to the spoons in common use. There is, however, a danger here which does not seem to have been appreciated, and our contemporary (*The Field*) has fallen into an error in referring to the subject, and states that a tablespoonful represents a fluid ounce, when it should have been half-an-ounce. It should be clearly understood by all who have occasion to dispense or administer medicine that the original teaspoon held 1 dram (or 60 drops), the dessert-spoon twice that amount, the tablespoon twice the amount of the dessert-spoon.

Since the teaspoon dose is more likely to be the one adopted for strong remedies, it is of the utmost importance that the public should know that the teaspoon of ordinary use is no longer the measure of a dram, but more nearly approaches to two, the old-fashioned "Queen Anne" spoons being of 1 dram capacity, or near enough for all practical purposes. The other spoons are near enough for medicinal purposes, varying only to a slight extent.

Proportions are also named in a convenient way for amateur dispensers. Thus we are reminded that 1 in 8 is the same as 1 dr. in 1 oz. (8dr. 1 oz. apothecary's weight), 1 in 20 being 1 oz. in an imperial pint, which is, of course, 20 oz. and not 16, as we get it in a "reputed" pint of Bass. We recommend those of our readers who seek veterinary advice through the inquiry column to cut out this portion referring to weights and measures, as it may save them unnecessary journeys to the market town, and give them confidence in making up homely remedies for stock.

Poultry.

THE INDIAN RUNNER DUCK.

WE have had many inquiries about this breed of duck, and we cannot do better than publish the remarks on the subject by Mr. D. F. Laurie in the South Australian *Journal of Agriculture and Industry*. Mr. Laurie says:—On one or two occasions I have alluded to this coming variety. I alluded to the marvellous laying powers reported as belonging to the breed, and urged fanciers and breeders to import some. This, eventually, the Hon. W. B. Rounsevell did, and had extraordinarily good results the first season. His birds came from Cumberland, and arrived on 18th December, 1896, and started laying in a few days. He bred over 100 during the summer and autumn from a drake and three ducks. Mr. G. H. Dean, who had eggs from Mr. Rounsevell and from Mr. Cadell, of New South Wales, had also a nice lot, and has since then purchased the whole of Mr. Cadell's imported breeding stock (including amongst which are birds bred by Simon Hunter, of Northallerton, G. Bishop, J. Donald, of Cumberland, and Cook and Sons, of Orpington House, St. Mary's Cray, all of England). It is an enormous advantage to intending breeders to be able to obtain so many different strains of blood. Mr. Dean speaks in enthusiastic terms of the breed. Mr. S. Pitman, of Paynecham, a well-known poultry-breeder, has an excellent flock of Indian Runners. His ducks are of imported strains, and his drakes from Mr. Cadell. Some months ago I published in the *Journal of Agriculture and Industry* the results of the laying of his nine ducks, and I am now pleased to further amplify their very splendid record. The nine ducks were hatched 16th November, 1897. They laid during May, 25; June, 151; July, 206; August, 248; September, 234; October, 249; and to 19th November, 141; making a total of 1,254 eggs, or an average per bird of 139, or equal to about 280 eggs per bird per annum. In addition to distributing sixty sittings of eggs, Mr. Pitman has a flock of over seventy young birds. It shows, therefore, that a great many people have availed themselves of the opportunity of obtaining these great layers. All who have had any practical experience of breeding ducklings for market know that the average duck is a poor layer, and, moreover, many of the eggs laid early in the season are infertile. Now, in addition to the birds being great layers, the eggs of the Indian Runner are, as a rule, all fertile. It is quite possible, especially in the cooler portions of the colony, to breed ducks all the year if eggs can be obtained. Ducks require but little space to grow and fatten in, so that as long as the young ones are well fed and kept cool and shaded, they will grow into good marketable birds. Now, although the Indian Runner, in comparison with Pekins, Rouens, Cayugas, and Aylesburys, is a small bird (the weight for the show pair is limited in England to 4 lb.), still, when compared with the ordinary farm duck, the weight of the Indian is often in its favour, while by carefully weighing bone and offal the test is still more favourable, for the Indian Runner, with small offal, has very fine bone, and carries meat of excellent flavour. The Runner is a quick maturing bird, and the ducks are very precocious as layers. These are two important points to consider. We have the size and weight in the before-mentioned large breeds; therefore we have only to use the Indian Runner blood to gain these other two points. I have inferred that, as regards crossing with common ducks, the loss will be slight in weight; and as regards crossing with the larger breeds, the crossbreds are of excellent size and quality. Mr. Dean noted that his Indian Runners obtained from Mr. Cadell were larger than usual. Mr. Cadell stated that invariably the progeny

of his imported birds were larger than their parents. Indian Runners breed very true to standard; the breed is very prepotent, and stamps itself to such a marked degree that crossbreds often closely resemble the pure bird. The main point about an Indian Runner is his gait—the peculiar run, quite free from waddle, from which he gains his name. This run is justly considered the hall-mark in England—taken, of course, with erect carriage, high-held head, long neck, and slim, graceful body. Colour should not be washy, but a nice full fawn, the duck having a slight pencilling. The heads of both sexes should be fawn-coloured. The drake's beak is, more or less, a greenish yellow, and the ducks more of a leaden-green colour. The wings are white, and when folded give the bird the appearance of having a white saddle. Birds of various colours have been sold in England as the genuine article, but of late there have been some very fine specimens exhibited, notably a pair which Mr. Digby, the well-known duck-breeder, won with in 1896 at Birmingham. I advise crossing Indian Runners with Pekins or Aylesburys, and then next year select the finest crossbred ducks so bred, and mate back either to Pekin or Aylesbury blood. I think any way would be good for producing a good crossbred—*i.e.*, first, back again to Indian Runner, whilst sacrificing size would give very greatly improved laying powers; secondly, back to Pekin or Aylesbury (using birds of a different strain), whichever variety was used in the first cross, would give size at any rate, and none need be kept as layers; thirdly, going back to Pekin, when Aylesbury was used in the first cross, or *vice versâ*, we should gain all the merits of a triple combination. Thus, we know the Pekin-Aylesbury is a splendid cross for the table; we also see here that the Indian Runner is an early maturer of excellent quality, and in addition a good layer. In all matters of cross-breeding extra caution is needed; fair results can be obtained by gradually improving the stock each year, by infusing pure blood; still the results of haphazard introductions of new blood can never have the same certain results as obtain when careful matings are made to produce first crosses. There is little doubt in my mind that the Indian Runner will prove a potent factor in the success of the poultry industry in this colony. Old or young, they are very hardy; they are excellent foragers, and prefer to live on insects, &c.; they are therefore eminently suited for the fruitgrower. At night they should be housed in a well-ventilated shed bedded on straw; in the morning as soon as they have laid, they may be released; they generally return at night for an evening meal. Active foragers such as these do no harm in an orchard. Beyond an occasional bath and drinking requirements, Indian Runners are not over-partial to water.

I shall be very pleased to hear from any readers as to their season's experiences, and other items of interest; carefully compiled information concerning poultry-keeping in various parts of the colony will prove very valuable. Many people are afraid of publishing their methods; they need not be under any misapprehension, for there are many far more successful and with greater experience who are always ready to drop useful hints for the benefit of others.

All old stock should be disposed of. After the time of laying, say two and a-half years, a hen eats more than she pays for, and the cocks lose vigour.

FRESH MEAT BONE.

There is an idea amongst some poultry-breeders that when they are advised to give their fowls fresh meat bone, the bones should be those of meat after it is cooked. But the term "fresh meat bones" means the bones of animals newly killed, with all the juices in them. These can be obtained in any quantity in towns for very little, and of any good butcher in the country. No more beneficial food can be given the poultry than fresh bones, well broken, as they are easily digested, and go directly to aid in the formation of the shells of the eggs and the building up of the system of the bird generally.

HATCHING TURKEYS.

ALL poultry-breeders recognise the great characteristic of the turkey hen—her persistence as a sitter. She will sit on her nest till she starves to death, and resorts to many artifices to hide her nest and herself from passers-by. If her eggs are taken from her, she will still continue to sit, and has not enough sense to detect the difference between stones and eggs. Her regular time for sitting is about thirty days. When the young birds are hatched, the mother does not trouble herself to teach them how to get their living. Unlike the hen she will not scratch and call up her brood. They have to forage for themselves. The best way to get your turkey chicks to feed quickly is to put two or three common hens' eggs with her own after she has been sitting for ten days. Then these young chicks, as soon as they are out of the shell, run about and pick up food—an example which the turkey chicks are not slow to follow. The best place for breeding turkeys is in high scrub lands, where there is abundance of such animal food as turkeys delight in, especially the snails, of which quantities of the shells may be seen about the mound-nests of the tallegalla or scrub-turkey. Low, wet lands are quite unsuitable for turkey-rearing.

AUSTRALIAN EGGS.

TOWARDS the end of October the Agricultural Department exported for two firms in Melbourne 34,400 dozen eggs in the R.M.S. "Himalaya" to London (says the *Australasian* of 27th January). They were gathered here in the season of plenty, and reached England shortly before Christmas, when eggs were scarce. Mr. J. M. Sinclair, representative in London of the department, reports that the consignment, which was packed in 1,701 boxes—the largest shipment which ever left Victoria—arrived in good condition, having been carried at a temperature of about 36 degrees. Most of the eggs were packed in pea husks, but, as sufficient of that packing material could not be obtained at the time, a number of the boxes were filled with oat husks. Although all the eggs on reaching London had a fresh appearance, those packed in the oat husks were found to have a peculiar flavour, which was attributed to the packing material, the eggs in the pea husks being all that could be desired. It is stated by the department that the eggs realised 9s. 6d. and 10s. per "great hundred," or practically 1s. a dozen. They were purchased here at about 6d. per dozen, to which is to be added 3d. for packing, freezing, freight, &c., so that there was a fair margin of profit. Next season, if there is a likelihood of eggs being plentiful and shipments being made, care will be taken to provide a sufficient quantity of pea husks for packing. The experience gained with this consignment will be serviceable to the department in view of any future shipments.

The Orchard.

FIGS.

AMONGST the exotic fruits grown in Queensland none is so much neglected as the fig. Why this should be so is not quite clear, unless the idea has become fixed that without caprification figs will not prove a success. This is a mistaken idea. In the district around Smyrna, the great fig-exporting emporium of the Levant, the figs are not, as is generally supposed, inoculated artificially, but strings of wild figs are hung on to each tree, in the belief that the cynip fly, which is found in large numbers in the wild fig, is set free to impregnate and fertilise the fruiting fig. There does not appear to be an absolute necessity for this, as figs

come to maturity and ripen well at Mildura, on the Murray, without such adventitious aid; and in Italy, Switzerland, and other fig-producing countries of Europe no such artificial pollinating is deemed necessary. The fig seems to thrive in any kind of soil in Europe. In Italy it succeeds on very rich valley soils; and in France and Spain it thrives equally well on poor soils, providing lime and sandstone abound. One of the finest fig trees we have ever seen in Switzerland was growing on the top of an old heap of road metal, and bore large quantities of excellent fruit. It is, however, not our purpose to describe the cultivation of the fig, which is the province of the Instructor in Fruit Culture. What we now wish to point out is, that there is money in the fig when produced. The ripe fruit, we are informed, is in demand by the jam manufacturers up to 2d. per lb. A full-grown tree will produce from 225 lb. to 300 lb. of green fruit. Thus, supposing a fruitgrower to have 100 well-grown trees, each yielding 200 lb. of marketable fruit, he would realise nearly £170 for their produce. The cost of production, preparation, &c., less packing, according to Mr. C. Luffmann, of the Victorian Department of Agriculture, is about £8 per acre; and the value of good fruit during the months of May, June, and July is from £30 to £45 per ton. This refers, however, to dried fruit. On flat land from fifty to seventy trees per acre are planted, and the trees come into bearing during the third year.

Viticulture.

THE PRICE OF GRAPES IN SOUTH AUSTRALIA.

By E. H. RAINFORD,
Viticultural Expert.

As it may interest Queensland vignerons to know the value of grapes this season in South Australia, the following rates given in the *Australian Vigneron* for January are reproduced here with a few comments thereon. It may be mentioned that the prices quoted are for grapes delivered at purchasers' cellars, and that they represent a considerable increase on last season's rates. The continued increase in the export of wines from South Australia to Great Britain and elsewhere has had the effect of reducing stocks in cellars to a low ebb; consequently there is competition for grapes to replenish with:—

	£	s.	d.	
BLACK.				
Carbenet Sauvignon...	7	0	0	per ton.
Malbec	6	0	0	„
Black Hermitage	4	10	0	„
Dolcetto	3	10	0	„
Grenache	2	10	0	„
Mataro	3	0	0	„
Mixed Black...	1	10	0	„
WHITE.				
Riesling	3	15	0	per ton
White Hermitage	3	15	0	„
Frontignan	3	10	0	„
Verdeilho	3	5	0	„
Muscatel	3	0	0	„
Tokay	3	0	0	„
Sweet Water	2	10	0	„
Clairette	2	10	0	„
Pedro Ximeno	2	10	0	„
Mixed White	2	0	0	„

The object of the writer in calling attention to these prices is to point out the estimation which is given to each variety of grape in South Australia. The opinions of wine-makers in the colony which was the pioneer in Australian viticulture, and which yearly exports large and increasing quantities of wine to Great Britain and other parts, are worthy of consideration by Queensland vignerons.

The Carbenet and Malbec are far and away the best grapes for light-red wines of the claret class, and are paid the highest prices; yet there is only one vineyard in this colony that, to the writer's knowledge, contains these grapes in any quantity, and that is Mr. Lambert's, at Mount Walker. The best claret grapes are therefore practically non-existent in Queensland, Black Hermitage, an excellent all-round grape, comes next in value, and this is fairly plentiful here. Dolcetto and Grenache are wanting in Queensland—the former a good light-red wine grape, the latter a variety for sweet wines.

Mataro or Espar, with its *confrère*, Black Spanish, are in the majority in this colony, but, with the exception of the Grenache, it is the least esteemed in the south.

Pineau or Black Cluster apparently has no place there, or comes in with the Mixed Black at £1 10s; yet this is one of the commonest vines in Queensland.

Coming to the white grapes, it must be explained that the lowness of the price compared to the red grapes, is caused by the demand being infinitely less than for the red, as the bulk of the wine exported is red wine. The highest prices are paid for Riesling, W. Hermitage, and Frontignan; up to the present the writer has not met with the *bonâ fide* Riesling in this colony, and very few Frontignan.

The Verdeilho comes next at £3 5s., and it must not be confounded with the so-called Verdeilho of Queensland, which is nothing but the Clairette, one of the least esteemed in South Australia. The writer has met with the real article in one or two vineyards, under the name of Madeira.

The Tokay is not at all a common grape in Queensland, but it is a first-rate grape for all-round work. The Sweetwater and Clairette are very common here, and the least esteemed down south.

The fact is, in the early days of viticulture in Queensland, as it was in South Australia, the mistake was made of planting for quantity and not for quality; but in the latter colony vignerons have long since found out that fine wines are not to be made from inferior grapes, and the Mataro and Chester, &c., have to a great extent been rooted out or grafted with the finer varieties, whereas Queensland still continues to replant them. With federation in view, and southern competition to be met, it behoves Queensland vignerons to move themselves in this respect, and for the future to plant nothing but the finer varieties of vines, and if the existent common kinds could be grafted (not necessarily all at once) so much the better. An excellent example of what a vineyard should contain is to be found at Mr. Lambert's place at Mount Walker. The red varieties are Carbenet, Malbec, and Black Hermitage, with some Mataros, and Black Spanish he still clings to for old times' sake. To these could be added the Dolcetto and one or two good French vines. The white varieties are the W. Hermitage or Roussonne, the W. Pineau, the true Verdeilho, the Tokay, and W. Portugal. To these could be added the true Riesling, Sauvignon, and some Port and Madeira grapes now being raised by this department. The Frontignan is a very valuable white variety for sweet wines.

If the above choicer kinds were more commonly grown in this colony it would be a considerable step towards meeting coming competition from the south.

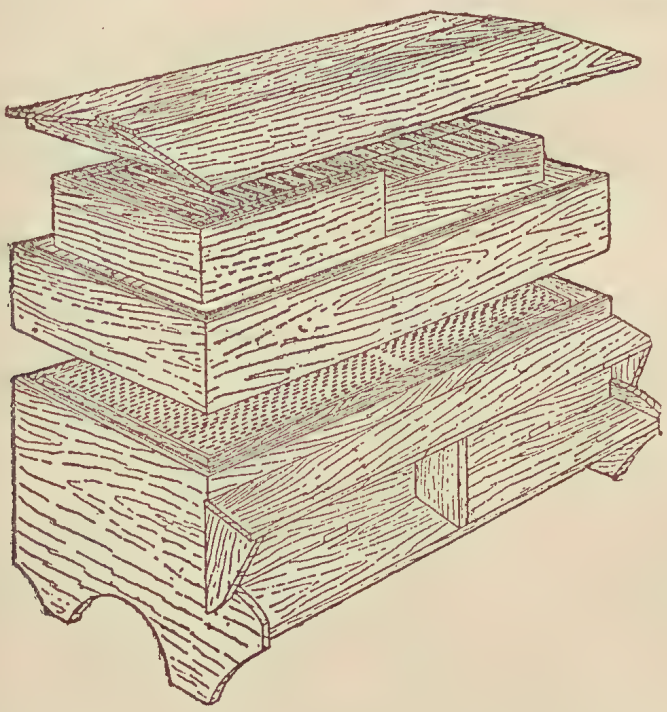
Apiculture.

THE WELLS SYSTEM OF BEE MANAGEMENT.

By H. R. STEPHENS, Busy-Bee Apiary, Toowoomba.

I herewith forward for publication in the *Queensland Agricultural Journal* a new system of bee management and of a hive which was brought to the notice of beekeepers by a paper read before the British Beekeepers' Association in March, 1892.

Briefly described, this hive is a bar-frame hive with a brood chamber double the ordinary length—say, of a capacity to hold twenty standard sized frames, and having the appearance externally of two ordinary hives placed side by side under one cover, with two entrances for bees into the interior. A perforated wooden beetight partition, placed across the centre of the brood chamber at right angles to its length, divides it into two compartments, each holding half the frames. When the super is in use, a sheet of queen-excluder zinc is laid over the tops of the frames, over which is placed the super to hold shallow frames or section crates. This super is common to the divided chamber below —that is to say, it is not divided by a partition, as is the brood chamber.



The partition or division board in the brood chamber, which is an essential part of the invention, is made of a piece of clean pine of a correct size for a close fit, and $\frac{3}{8}$-inch thick, with the edges bound with narrow strips of tin plate, creased longitudinally, and folded over the edges of the wood to prevent warping by damp. It is freely perforated with holes burnt through with a hot wire $\frac{1}{16}$-inch in diameter, care being taken that the holes are not

large enough to admit bees from one side or the other. In working the hive, two colonies of bees with their queens are established, one in each division of the brood chamber, each colony making use of its own entrance to the interior; and, as the bees are close to each other against the partition, the system stimulates breeding and rapid multiplication of the number of bees. When the honey season arrives, the brood chamber, being fully occupied by the bees, the super is put on and arranged as described, where both colonies work together in harmony. Being strong in numbers they build comb and store honey more quickly than they would were the colonies working independently, especially so in poor seasons.

As may be supposed, the queen must on no account be allowed to pass from that division of the brood chamber to which she is allocated to the other, which implies that the hive parts must be accurately fitted together, as the consequence of the queens meeting would be a pitched battle and the death of one or other of them, the survivor receiving the allegiance of the two colonies, which would then unite. It is not advisable for a beekeeper to adopt the Wells system until he has gained practical experience with bees and bee manipulations, for, as will be gathered by the above remarks, the bees are kept under conditions imposed on them by art and such as their natural government does not approve.

HONEY AND BEESWAX IN VICTORIA.

THE following statistics in relation to apiculture in Victoria will be of interest to Queensland beekeepers, showing as it does the increase of the industry in 1899 over the results of work in 1898 :—

Shires.	Beekeepers.	Beehives.	Honey.	Wax.
			Lb.	Lb.
Avoca	99	909	86,645	2,358
McIvor...	58	798	82,891	1,421
Wodonga	13	260	49,130	541
Wimmera	20	310	49,097	802
Strathfieldsaye	45	601	43,964	721
Beechworth	43	638	39,638	588
Korong	84	759	29,152	1,025
Kara Kara	56	438	28,560	1,274
Stawell	53	273	28,476	502
Avon	15	205	27,560	474
Oxley	106	438	26,333	931
Rodney	102	526	21,247	297
Mildura	15	201	19,235	221
Maffra	10	359	17,121	408
Newstead	70	422	15,214	616
Arapiles	7	199	14,046	222
Metcalf	52	319	12,520	410
North Ovens	69	371	12,036	243
Benalla	57	312	12,022	350
Lexton...	66	297	11,186	380
Tullaroop	51	254	11,450	247
Other Municipalities	2,004	19,251	243,398	8,155
Total 1898-99	3,095	19,140	881,221	22,213
,, 1897-98	1,857	14,225	195,163	7,782
Increase	1,238	4,915	686,058	14,431

NOTE.—Of the 1898-99 total, 16,334 hives were returned as producing honey.

Plate CLXXVIII.

MEDICAGO DENTICULATA.
(The Burr Medick or Clover.)

Botany.

THE BURR MEDICK, OR CLOVER (*MEDICAGO DENTICULATA*, Willd.)

This plant is said to be one of the most pestilential of all our burr-bearing plants. Mr. J. H. Maiden, Government Botanist and Director of the Botanical Gardens, Sydney, says of it:—

The name of the plant is derived from the Greek word *Medike*, given by Dioscorides to a kind of grass, and the Latin adjective *denticulata* signifying having small teeth, in allusion to the margins of the leaves. Its vernacular names are—Burr Clover, Creeping Burr, Medick Clover, Medick Burr, Toothed Medick. Botanically, it is described as a nearly glabrous plant, with small yellow flowers; has lanceolate stipules, and with a flat pod, deeply reticulate, with two or three folds and a double row of spines. It is usually an annual, but in many sheltered places in the coast districts Mr. Maiden believes it may be perennial.

The pastoralists make many complaints against this plant, because the wool is seriously injured by the burrs becoming entangled in the fleeces. To such an extent does this occur that Mr. Maiden has seen fleeces which he says it would be no exaggeration to say that the greater part consisted more of vegetable matter than of wool, and, as the ordinary processes for cleansing wool are useless with fleeces in such a condition, very heavy losses are sometimes experienced by the woolgrowers.

There is another objection urged against the Burr Clover, and that is that, owing to its rapid and dense growth, it smothers out nutritious but less vigorous pasture. Finally, in early summer it dies down, and owing to the above cause there is no pasture left for the stock at a period when food is most wanted.

Considered as a forage plant, Mr. Maiden says:—"I do not call to mind any series of comparative experiments (chemical and physiological) which would give us specific data as to the value of this plant for forage purposes, but the general opinion is that, while nutritious, it is of second-class value. We must suspend our judgment in this respect, but we are certain that in many parts of the colony it produces an exuberant growth of bright-green fodder which stock eat readily enough, and on which they appear to thrive. It is only beyond the Dividing Range that it becomes a real nuisance, for in the coast and coast-mountain districts comparatively few sheep are kept, and the burrs are neither so abundant nor as rigid as those from plants on the Western plains. It originally came from the Mediterranean region, but is now naturalised in most temperate and warm countries."

Our illustration is from a block kindly supplied by the *Agricultural Gazette* of New South Wales, from which journal the gist of our article is taken.

Tropical Industries.

COFFEE—THE POOR MAN'S CROP.

No. 1.

BY HOWARD NEWPORT,
Instructor in Coffee Culture.

SOME few remarks on coffee culture in general, without any reference to its treatment in the field, curing-shed, or market, may perhaps be of interest—the more so as some ideas and remarks have recently been made and taken up that have, perhaps, just missed the point and so, to many, become misleading.

The cultivation of coffee in Queensland differs in several essential points from its cultivation in most countries in which it has hitherto obtained a foothold. The principal points to be taken into consideration in searching for new land and localities may be taken as temperature, rainfall, climate, soil, and labour. Of these the first three might perhaps be looked upon as one and the same and summed up in the term "climate," but there are many instances where, though the temperature be not too low and the annual rainfall neither too large, too small, nor too much at a time, the cultivation of coffee is impossible for other atmospheric conditions, such as liability to cyclonic disturbances, &c.

Being a tropical plant, the area within which it can be successfully propagated is limited, but in this zone it will adapt itself marvellously to very different conditions, and in so doing the growth and nature of the tree will change considerably. In acclimatising itself to an arid sandy soil, a uniformly high temperature, a low rainfall, or a dry climate, the small, short, almost stunted growth becomes pronounced; and in the rich soils, comparatively heavy rainfalls, and humid temperatures, the long stem between the axis and the large and loosely built leaf and tree become, in a few generations, such marked characteristics that, even on being transplanted from the one extreme to the other, these are retained so long as to cause the plant to be given almost a different name.

In the natural spreading of the cultivation of coffee from the point where it was first grown as a commercial product, it has gone from country to country each in turn, while having very similar climatic conditions with better or richer conditions of soil.

Its strides in the direction of new and richer soils, and consequently heavier yields, have been more marked and more noticeable than in the direction of either lower temperatures or less labour. Although there has been movement in these matters, also, it has been so much slower that coffee has earned for itself a name as an industry almost exclusively belonging to the Oriental climate and black labour. Since so far the cultivation of coffee has not spread beyond the area of Asiatic or coloured nations, the question of reducing the amount of labour necessary has not been a particularly pressing one, owing to the extremely low wage on which such nationalities can subsist. Latterly, however, the increased output from the greater area under its cultivation has forced growers to give considerable attention to the matter of yield; and in its search for conditions favouring such, coffee has come to the Australian continent, where temperature, rainfall, climate, and soil, and all the conditions necessary to its growth are, even from the most pessimistic standpoint, exceptionally favourable and very much in advance of almost any land yet under cultivation within the tropics.

Coffee, by coming to North Queensland, has passed without the pale of the turbaned Arab and scantily clad Oriental, with whom its cultivation has been associated in our minds since it became known as a beverage, and in so doing has committed the—to conservative minds—heinous crime of breaking through

Plate CLXXIX.

COFFEE PLANTS READY FOR TRANSPORT.

custom. Some say, and will state publicly, that they would not venture in or believe in coffee culture unless they can see prospects of a good supply of labour—even that coffee culture in Queensland is impossible with the present state of the labour supply, &c. The answer to the question, "What about labour for your coffee?" demands more consideration than would at first appear. Because under conditions obtaining elsewhere it has been considered necessary, it does not follow that the 1,000 hands for the 1,000 acres, or one man per acre, are indispensable here.

The question to be discussed is rather whether the conditions necessary to the successful cultivation of coffee, in this practically new locality, *demand* this tremendous supply of labour before we cry out against the inability to obtain it.

Coffee-growing would admittedly be practically impossible in Queensland if bound to methods and conditions usually obtaining elsewhere. These conditions, however, are, as I have already stated, very different in several essential points. For instance, it is not necessary here to climb precipitous mountain slopes to get the climate, or to go away back into the roadless, trackless jungles to get the soil, or the higher altitudes to get the rainfall. It is not necessary here to avoid the lowland plains on account of poverty of soil, withering heat, or lack of rainfall; nor is it necessary to keep under cultivation so many hundreds of acres to make a livelihood. And the bearing that all this has upon the labour question is often lost sight of and sometimes deliberately ignored.

Where all the necessary climatic conditions are obtainable on gently undulating, almost level country, on soils in which manuring is quite unnecessary for many years to come, and yields obtained four to five times as large; or, in other words, give an equal return from a quarter the area; where transport is reduced to a minimum, and appliances such as scufflers and cultivators can be made use of, it will be readily seen that the same amount of labour is *not* required.

The comparatively sparse population of this colony undoubtedly precludes the opening up, even by capitalists, of large areas. It will be generally admitted, I think, that it is not so much the cost of the white labour, as compared to the wages of the Oriental, that would be felt, as the inability to obtain large gangs at present, especially for temporary work. Until Queensland is considerably more populated, the opening up of estates under coffee, in anything like the acreages we have become accustomed to hearing of, is very much restricted.

The area here is practically limited to what each grower can for himself, and by himself, keep in order and cultivate. To take a 10-acre block as an example—not necessarily thereby implying either that it is inadvisable to attempt more or that less would not pay. I think that the majority of farmers would smile at the task of cultivating so little; but to growers in other countries, 10 acres of growing coffee, with never a "coolie" to cultivate, would seem a very different thing. The weeding of such a block would mean, under our conditions, the going over it once in four to six weeks with a horse cultivator (a work of, say, five days), or with a hand cultivator (say ten days), or a hoe (say twenty days' work), during the dry weather; and in the wet months the sickling down of weeds before they seed would be still lighter. The handling and pruning of this block at the same time is well within the scope of the owner to do, as also any other little work necessary to growing coffee. And these works will then practically have cost what the growers in many countries now pay for superintendence alone, the difference being that in this country a white man—European—*can* work, and in working do a vast amount more than the Oriental, while in nearly every country where coffee has hitherto been cultivated manual labour by the white man is a physical impossibility.

Taking it for granted that a farmer can work 10 acres, let us look at the output.

I have a letter before me quoting the average yield per acre in Coorg, South India, at 2½ cwt.; and if statistics were taken for the whole of South India, Ceylon, Java, Honolulu, and all the high-grade coffee-producing centres

in the world, I doubt if the average would exceed 5 cwt. In Queensland we have a very possible (and frequently reached) 20 cwt., a probable 15 to 16 as an average, and an easy and ordinary 10 to 12 cwt. with very little attempt at cultivation, per acre. This with a "best possible" of 28 cwt. off an acre of under 700 trees.

It might be argued that, the extra bearing capabilities of coffee being admitted, the actual necessity for so much labour is not obviously lessened for its gathering. But consider the cost of scrambling over 40 acres of steep land for 5 tons of coffee and then carrying it down the enhanced distances (unavoidable in the larger area) to the cost of collecting the same amount from easily accessible, approximately situated land of one-quarter the extent. It means practically that the same expenditure of energy will produce a greater result—or less labour for the same work. In picking, the work must undoubtedly be reduced as much as possible on account, as I have said, not of the cost of the labour so much as its scarcity. Even picking a 10-acre block, giving 10 cwt. or 5 tons, means some 15 tons of cherry, which, spread over three months or so, would keep two men or boys hard at it. Practically it means, therefore, that two men or boys will be necessary for even 10 acres, besides the farmer himself. Were this multiplied by ten, the obtaining of sufficient hands would be almost an impossibility, as can be readily understood, while the extra hand or two needed is generally readily obtainable. Now as to the paying. This 5 tons off 10 acres, if sold at £50 a ton (I am purposely quoting figures so low that even the most pessimistic cannot cavil at on the score of over-sanguineness), would give a gross income of £250. Deducting, say, £2 a week for the owner's living, a balance of about £150 remains, out of which to pay for the two helping hands for a few months, transport of crop to town, and interest on or part repayment of the initial cost spread over the first three or four years—surely a fair margin.

It will be seen, therefore, how coffee, as an industry in Queensland at the present day, is practically debarred the large capitalist with his thousands of acres, while the *workers*—the men who have a selection on which, perhaps, the wife and family are already resident—the men who have employment in many of the local industries that need them only for a given period of the year—and especially the men who, without any outside work, having enough only to see them through the initial period of waiting, take up small selections and make coffee culture their work: these can make, if not a fortune, at least a very good and comfortable living of it and independence.

In this way coffee culture in Queensland will be, and already is in many instances, the small selector's best paying crop, or what would be a better expression than the poor man's crop—the *working* man's crop.

No. 2.

IN the foregoing article entitled "Coffee—the Poor Man's Crop," I have, of course, been speaking of coffee as an already opened-up estate, and not gone into the question of cost of opening, &c. This I hope to do in course of time, but a few remarks on points that have already been publicly touched upon may be of advantage. With regard to the cost of opening, the fact of having so many acres of coffee, whether in bearing or not (since it is a commodity that once in does not require an annual replanting), very much adds to the value of the farm, and if in bearing, and an income can be shown on the books from it, very much enhances that value, so that the cost of opening can be looked upon in the light of an investment, the full value of which is realisable should the farm be sold.

The advantages that the cultivation of coffee in small areas has for the farmer or the family in the bush, and the overcoming of labour difficulties in in this way, are obvious. This opens up the question of education of children in connection with coffee-picking—another point that many bring forward in talking of coffee. In the foregoing I have allowed for the employment of hands

without referring to the employing of the children of the farmer, but undoubtedly if children could be used for the work it is an advantage, for in picking a child can do as much as an adult. Keeping children back from school in the bush for the picking season, say three months or so, does not, either, necessarily mean neglect of their education for the rest of the year.

Another advantage to the farmer is in being able to keep in the house a bag of coffee, the roasting and grinding of which would trouble the housewife but little, and the subsequent preparation is no more troublesome than tea. As a beverage it will be found not only pleasant but more sustaining and wholesome than tea, at a cost of considerably less than 2s. per lb.

Grubbing.—In opening up, in the first instance, the question as to whether it is advisable to grub the land or remove the stumps of the scrub timber is one that must be left to the individual to decide. If forest land is opened, and there are comparatively few stumps, the removal of these might be cheap and would at once admit of cheaper working by the use of horse-power in weeding for the first three years. In scrub land, however, it is doubtful whether the cost of removing the stumps is covered by the difference between hand-hoeing and horse-scuffling, since this can only be done for three years, the coffee trees so covering the ground in the fourth year, as a rule, that horsework is again precluded. The stumps will not interfere with the growth of the coffee, and, if the lateral roots are cut away round the stumps before planting the coffee, their presence will be no disadvantage, save on the one point of prohibiting horse cultivation. From the fourth year hand-hoeing would have to be resorted to in any case, but by then not only will there be many less weeds on account of the lateral spread of the coffee, but most of the stumps will have rotted away. If the land opened is dense, thick scrub, heavily timbered, I do not think the advantage warrants the expenditure in grubbing, but for anything less it must be for the grower himself to say whether the cost of their removal will be compensated for by the subsequent saving in working within three years.

Two Crops on the One Land.—The cultivation of any other crop on the same land as coffee is to be strongly deprecated, whether corn, rice, pines, or potatoes. If there is anything worse than corn or rice, it is a root crop such as sweet potatoes, as the effect of this crop will be apparent in the stunted growth of the coffee for years to come. Growers will do much better with both their corn crops, &c., and their coffee, if kept in separate blocks; the little apparent saving in weeding and cleaning by keeping them on the same land is more than lost subsequently, for the maturing of the tree is retarded rather than encouraged; and although the value of the catch crop be taken into consideration, it is more than paid for by the loss to the soil, and by frequently having to wait for another year for the maiden crop of coffee.

The growing of leguminous crops as green manure is a different matter, but even in this case, if the coffee is young, the gain to the soil is counterbalanced by damage to the tree, if the plant be allowed to grow over the coffee and be not cut or ploughed in when green and young. The disadvantage of cow-pea is that it overgrows and chokes the coffee, damaging the young trees, and, if great care is not exercised, breaking the primaries of the old trees. For this reason, almost anything of the nature of a climber is of little use; some such leguminous plant as clover, for instance, if it could be got to grow in so warm a climate, or some of the non-climbing dwarf varieties of beans, such as the French, might be of advantage.

Shading.—The shading of coffee in Queensland is as a general rule unnecessary, and all the sunshine available is needed for the growth of the tree and ripening of the crop. In certain localities, such as parts of Mackay, shade is an advantage; and where such is the case, leguminous trees such as some of the Erithrinas, Cassias, Bauhinias, or Acacias would at least not detract from the quality of the soil, yet at the same time would give as much shade as was required. Corn or such growths do no good as shade. They do not protect the plant at all vertically, when the sun is fiercest and the tree needs shade, and at other times shut out the air and ventilation, and if continued produce in the coffee a long, thin, weedy growth with no stability and a yellow

sickly appearance; or if the coffee is young, have the opposite effect of not permitting any growth at all, and keeping the plant so stunted as to become barkbound and practically useless.

Corn or such crops heat the ground, and in this way have an almost opposite effect on the coffee to shade from trees. There is just the difference between these shades as between a great-coat and an umbrella—the one may keep off the direct rays of the sun but retains all the heat, while the other allows of free circulation of air. Trees, by the amount of dropped leaf, &c., keep the ground moist under them. Corn extracts the moisture, and leaves little or nothing for the coffee.

Mulching.—If this is resorted to, it should be done just at the end of the wet weather, and only green matter used. During the dry weather a loose earth mulching will do better than a grass mulching by breaking the continuity of the capillary tubes through which the moisture is extracted, and retaining it where it is readily available to the plant roots. The green mulch, on the other hand, retaining the moisture above the surface of the ground, attracts the roots to it where they are liable to harm from exposure by removal or rotting away of the mulch, or even scorching in spite of the mulch, in continued very hot weather.

Continued heavy mulching with greenstuffs during the rainy season, although the mulch rots quickly enough, is apt to encourage if not produce fungoid growths about the roots, and should therefore be avoided.

Blights.—Blights of any serious nature on coffee in Queensland may be said to be conspicuous by their absence. Some little time back there would appear to have been a rumour that *Hemeleia vastatrix* had appeared, but I understand it was proved to be a fallacy on reference to the Government Entomologist. Hitherto no sign of its presence has been observed, and too great credit cannot be given to the Department of Agriculture for its long-sighted policy in endeavouring to prevent its importation. It is to be hoped that private individuals will assist rather than hinder the Department's endeavour in this direction, and refrain from ever attempting the importation of either coffee or plants or even the seed of shade trees from the infected localities, for, knowing the terrible ravages of this disease, there is but little doubt that the coffee industry, young, flourishing, and with the bright prospects that it has, will be doomed.

Cutting Weeds.—The remark *re* cutting weeds in the wet season may be inexplicable to many readers in this colony, perhaps, as well as to outsiders. It must be borne in mind, especially in countries where it is considered a *sine qua non* to keep the coffee as clean as a new pin all the year round, that in rich soil and with short labour it is almost impossible to keep up such works during the wet season, when not only is the growth quicker, but the weather hinders continued work. Moreover, the leaving of weeds, if sickled down before any possibility of seeding, has the advantage of saving wash and covering the ground during the alternating hot spells, as well as cheapness or speed of execution, and the weeds take little or nothing from the soil if kept cut, the more especially if conscientiously followed up by a digging or deep hoeing as soon as the hot weather sets in.

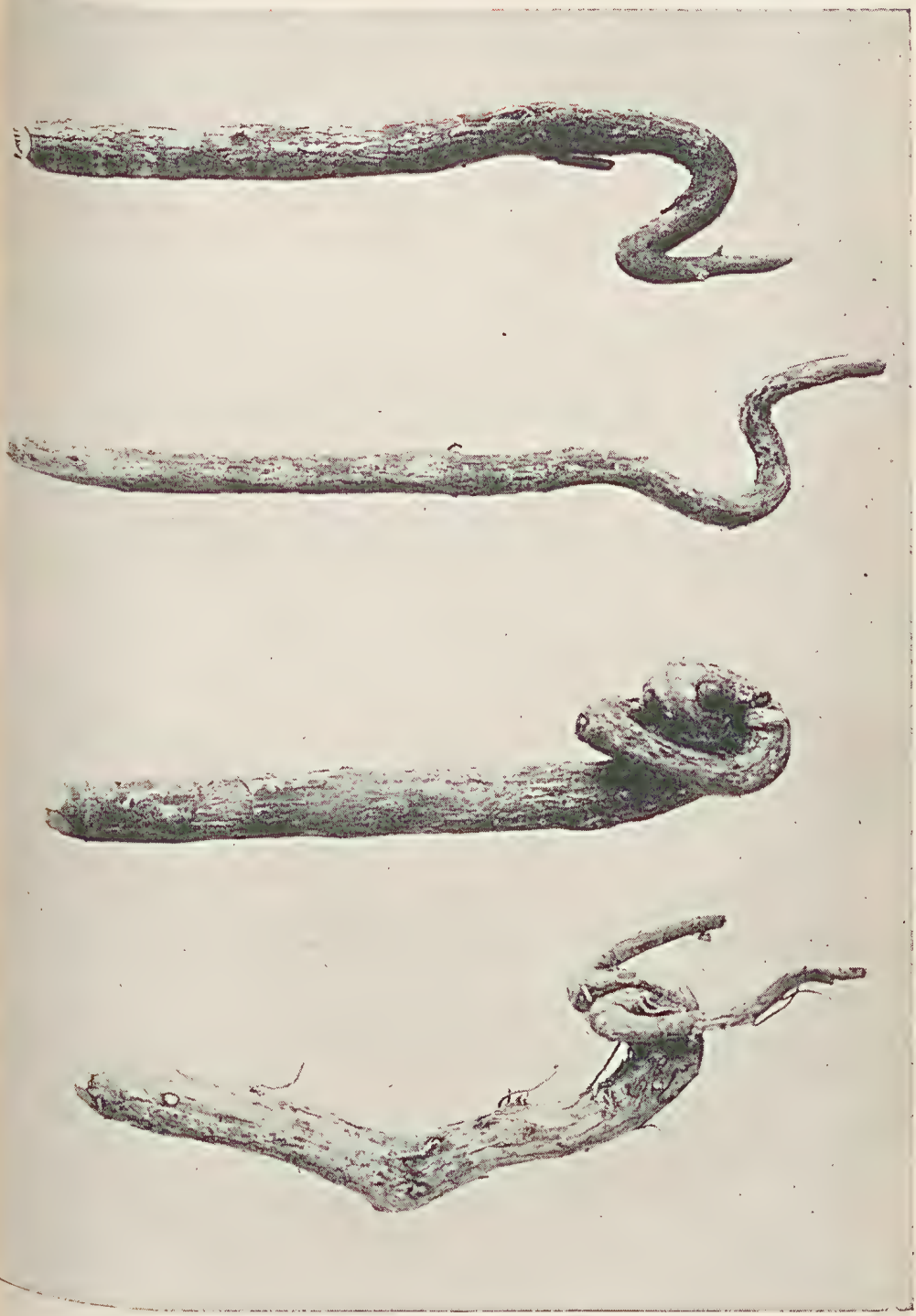
THE ROOT GROWTH OF COFFEE PLANTS.

By HOWARD NEWPORT,
Instructor in Coffee Culture.

THE matter of care and attention to the raising ef seedlings has received but scant notice in any of the works on coffee culture, several of which are generally to be found in the countries where coffee-growing as an industry has attained any dimensions worth mentioning. Yet it is one of the most important parts of coffee-planting, and in this country, I find, frequently the cause of failure and disappointment among growers starting.

DIRECTOR BOTANIC GARDENS MELBOURNE

Plate CLXXX.



ROOT GROWTH OF COFFEE PLANTS IMPROPERLY PLANTED.

The coffee tree is generally looked upon as a particularly hardy plant, and undoubtedly it is so, when it has reached maturity and after it has borne its maiden crop, if the conditions are at all favourable to its growth. Once it has got its tap root well into the soil and has a firm hold, it is difficult to kill a coffee tree outright. Cutting it down to the ground only results in the growth of a mass of suckers; burning will kill off the leaves and young twigs, and possibly even primaries, but in a few months it recovers; being broken up by a falling tree, after removal of the injured parts, produces a more vigorous growth if anything; remaining for a week or two under water in a flood will not kill it; and once matured, it will take a severe frost to kill it entirely. While the coffee plant is young, however, it can by no means be called hardy. Frequent stumping or cutting back will not injure it certainly, nor will a judicious root-pruning kill it, but any damage to or obstruction in the way of the tap root will at once become evident in the plant. All through the life of the tree the tap root is its most delicate feature, but more especially is this noticeable during the first few years of its life.

In the germinating bed, the nursery bed, or even subsequently, any bending or twisting of the tap root, whether accidentally, through carelessness, or by the unsuspected presence of some hard substance as rocks or stones in the field, is speedily resented by the young coffee tree. In the growth of its tap root coffee is peculiar. Unlike many plants, if the tap root meets with any substance that it cannot penetrate, it will not run laterally along it until it reaches the edge or some fissure down which it can go, but will turn again skyward and grow up towards the surface for a bit and then turn down again. In doing so, should it meet with any further obstruction or, in coming down again, meet the original obstruction, it will endeavour to do the same again. I have seen two complete turns, but, as a rule, the plant will die before the second loop is completed.

When any obstruction has caused the tap root thus to turn up, it will seldom rise more than 1 inch, and will turn down again in the same line as the main or original stem. In doing so, it will sometimes make a complete knot, as in one of the illustrations, but this is unusual. Frequently, however, it turns in another direction on coming down again, and though in so doing it forms no loop but what would appear to be merely a zig-zag or letter "S," if the root be carefully examined, it will be found to be at the same time twisted.

The effect of this growth on the plant above ground is generally very evident. While the tap root is turning in this way, very little growth, if any at all, will take place above ground. To one accustomed to coffee plants, however, the check that has been given to the young tree will be easily seen, even should it recover itself, and in a one or two year old clearing the trees that have been badly planted, or that have damaged tap roots, can be readily picked out.

On being thus checked, the tree does not at once die. If it did so, a great deal of time, trouble, and expense would be saved, but it will hang on, looking sickly and weak, and frequently will apparently recover on the tap root finding its way downward again. The recovery may sometimes be permanent, but this is very rare.

As a rule, it is only temporary; for when the first demand is made on its vitality by a crop, it is found not to have the stamina to bear it, and either dies out in its attempt to ripen it, fails to ripen it at all and drops it when half-grown, or ripens it and has no sap or vitality left to recover, or, what is worse, takes two years or more to recover sufficiently to bear another crop. Meanwhile the grower does not like to pull it up and lose three years in growing another, so he retains it at considerable expense in cultivation and work, while it repays him hardly enough to cover expenses.

It will be seen, therefore, that, although this unnatural condition of root growth may not be evident to the grower, it is a heavy handicap that may any time during the first five or six years kill out the plantation, while a little attention to the subject will save the grower endless worry and disappointment. I have seen several instances of fields of coffee suffering in this way, and in

most cases the soil, climate, or locality was blamed. I have also had shown me boxes of coffee seedlings grown in a veranda. Now, coffee seed will in a shallow box of mould frequently germinate readily in this way, but although the plants grow well to start with, if not put out into a nursery bed when quite young, they must unavoidably have their tap roots bent in time, and box seedlings, therefore, are very seldom to be trusted. However hardy the coffee tree may be when mature, not only will it pay for but it requires some attention when young for its successful cultivation.

Much the most satisfactory results will be obtained by growers if, as I stated in my paper on seed germination, they raised their own plants; but should it be found necessary for any reason to purchase plants, they will do well to go to one that, as far as possible at any rate, makes the raising and cultivation of coffee a specialty. In buying plants, if possible, see them in the bed before purchase; if this is impracticable, at any rate do not consider that because so much per 1,000 was paid for them that they are all perfect plants, but examine the roots before planting, and avoid the inevitable disappointment of putting out those with twisted and knotty roots. Look for the young plant of some five to seven months old and 6 to 9 inches high, thick stemmed, with very little of the base of the stem showing matured bark. A healthy plant of this age will have half or more of its stem green and soft, and a space between the green and the brown bark of reddish half-matured wood, and the brown bark itself loose and flaky. Pull up a plant or two—any looking stunted, for instance—and see whether the roots are straight. It is not necessary to examine all in a bed, but, if the packing for transport or other causes gives you the opportunity, certainly avail yourself of it and see that none are as depicted in the plate. Avoid the thin-stemmed plant with the white hard bark, matured right up to within an inch or two of the head; also avoid the plant that has made primaries. Having made primaries, a plant may still make a good tree, but extra care is necessary, unless stumping or pencilling is resorted to, and a large ball of earth taken with it. Such plants will nearly always, however, droop, and frequently the young primaries die off, in which case no others will grow in the same eyes, and the result is an umbrella tree or one that has no primaries within two feet or more of the ground. They will suffer from wind, allow weed-growth under them, &c., and never be as sturdy or strong as those that make their primaries in the field where they are to spend the rest of their lives.

In transplanting seedlings or young plants, it is often impossible to avoid the falling away of the earth round the root and consequent damage to either lateral or tap roots. In such cases care must be exercised in placing the laterals when replanting, and in pruning back the tap root.

When packing plants, it is best not to press the earth round the roots should it fall away, or if packed without earth to tie them in bundles, for in doing so the roots are often bent. In this way a bend is often given to a tap root that eventually becomes a twist or loop as shown in the plate. Where it is possible to have the earth on the roots, as shown in the plate with the paper entitled "Coffee Nurseries," it is always best to retain it, even if the trouble and cost of transport are somewhat more. The "ball" or brick of earth need not be quite so large, in packing plants for long journeys, as that depicted, which is for planting out in the immediate vicinity of the nursery bed. Two inches square by 6 to 9 inches long will be sufficient, and if taken out of the beds carefully the plants can be packed in a box so that shaking will not break the ball. Plants handled in this way and carefully put into a box without breaking the ball, with a little extra mould shaken in between them, will travel almost any distance without any check to their growth. Fig. II. shows a case of plants thus packed ready for transport, but with the end of the box removed and lying on one side, and the top covering of Hessian folded back, the better to illustrate the method of packing with the brick of earth and the undisturbed roots.

CULTIVATION OF RAMIE IN FOREIGN COUNTRIES.

(*From United States Consular Reports*, 1899.)

China.—There is a very large and well-defined industry in the cultivation of ramie in Southern China. The finest qualities are grown along the Yangtze, on the Island of Formosa, and in the Straits Settlements.

In the Fuchan district it is estimated that over 100 tons of cutting per acre have been taken. The cuttings contain over 80 per cent. of water, and the refuse from the decorticated fibre is returned to the soil, so that actually only about 3 per cent. of material is removed from the soil at each cutting. With care, four crops a year may be taken, and 100 acres will produce from 1,500 to 2,000 tons of green stems, of which about 5 per cent. will be good fibre. In the Hankan district in 1897 the exports amounted to 3,939,856 lb.

British India.—Reliable statistics concerning the cultivation of ramie in India are difficult to obtain, since it is not grown in sufficient quantity to be mentioned in commercial reports. Four or five cuttings can be made each year; the best crops are taken in June and August, but the February crop yields the finest fibre. It is estimated, roughly, that from 1,000 to 2,400 lb. of fibre per acre can be gathered.

Japan.—Ramie is known in Japan as "karamushi," and is cultivated chiefly at Yamagata kea. The seeds and roots are carefully manipulated by ploughing up the seedling, so that finally all the ground is covered up. The whole surface of the field is covered with dry manure, and from the second or third year after planting a crop can be gathered for twenty consecutive years. The amount of harvest is usually from 50 to 60 lb. of the commercial product and from 30 to 40 lb. of the raw material to the ¼-acre. The price is from 1·75 dollars to 2 dollars per 8 lb. of commercial product.

Korea.—Two kinds of ramie are cultivated here—the finer quality called "Moshi," which makes up into a fine, silky grass cloth, and a commoner variety, which grows as a weed anywhere, called "Sam." There is no export of either fibre or fabric, and in 1897 the import, mainly from China, was 216,845 dollars.

Straits Settlements.—In this district the cultivation of ramie is only in embryo.

Jamaica.—The yield per acre is said to be about 10 tons of green fibre, worth, say, £20. The cost of cultivating is from £5 to £10 per acre for the first year, and after that, for cutting and manuring, about £9. Thus there is a profit of about £11 per acre when in full growth.

THE SUGAR CROP OF 1899.

Notwithstanding the bright promise of a heavy yield of sugar per acre during the season just ended, the cane-planters, owing to several causes, have been doomed to some disappointment. The *Mackay Sugar Journal* says:—"The sudden fall in our production from 163,734 tons to, in round figures, 122,500 tons, is a serious set-back, and unfortunately it cannot be said that we can easily place our fingers upon one cause of the deficiency. The area under cane had been increased, and though the crops were hardly so heavy as the year before, yet there was reasonable probability that we should take off about 1¾ tons of sugar to each acre. A few days before we made our estimate of 148,000 tons, severe frost occurred in several of the sugar districts, but the widespread nature of the visitation was not known to us at the time. As a matter of fact, the frosts were mainly felt in the Northern sugar districts, the only place escaping being Cairns. From that district down to Mackay the cold was, for this country, intense, and the damage done was in proportion. The cold was followed by warmish, showery weather; and this, in the opinion of many, accounted for the fact that the cane went back a good deal faster after frosting

than has been the case in previous years." This deficiency in our sugar crop will, of course, signify much to the general trade of the colony as well as to growers and workers. "The Brisbane district showed a decline of 2,000 tons; Maryborough and Isis, about 4,838 tons; Bundaberg and Gin, about 8,000 tons; Rockhampton, about 376 tons; Mackay and Prosperine, about 14,650 tons; Burdekin, 6,060 tons; Herbert and Johnstone, 6,416 tons. Cairns showed 11,000 tons, against 10,467 tons the previous year; and Port Douglas 5,000 tons, against 4,273 last year. The total area cultivated was 111,012 acres, of which 1,312 acres were grown for green feed only, thus leaving 109,700 for crushing." Unfortunately, the sugar yield was not only light, but the quality was such that the farmers had to accept a lower price for their cane.

DR. MAXWELL'S REPORT.

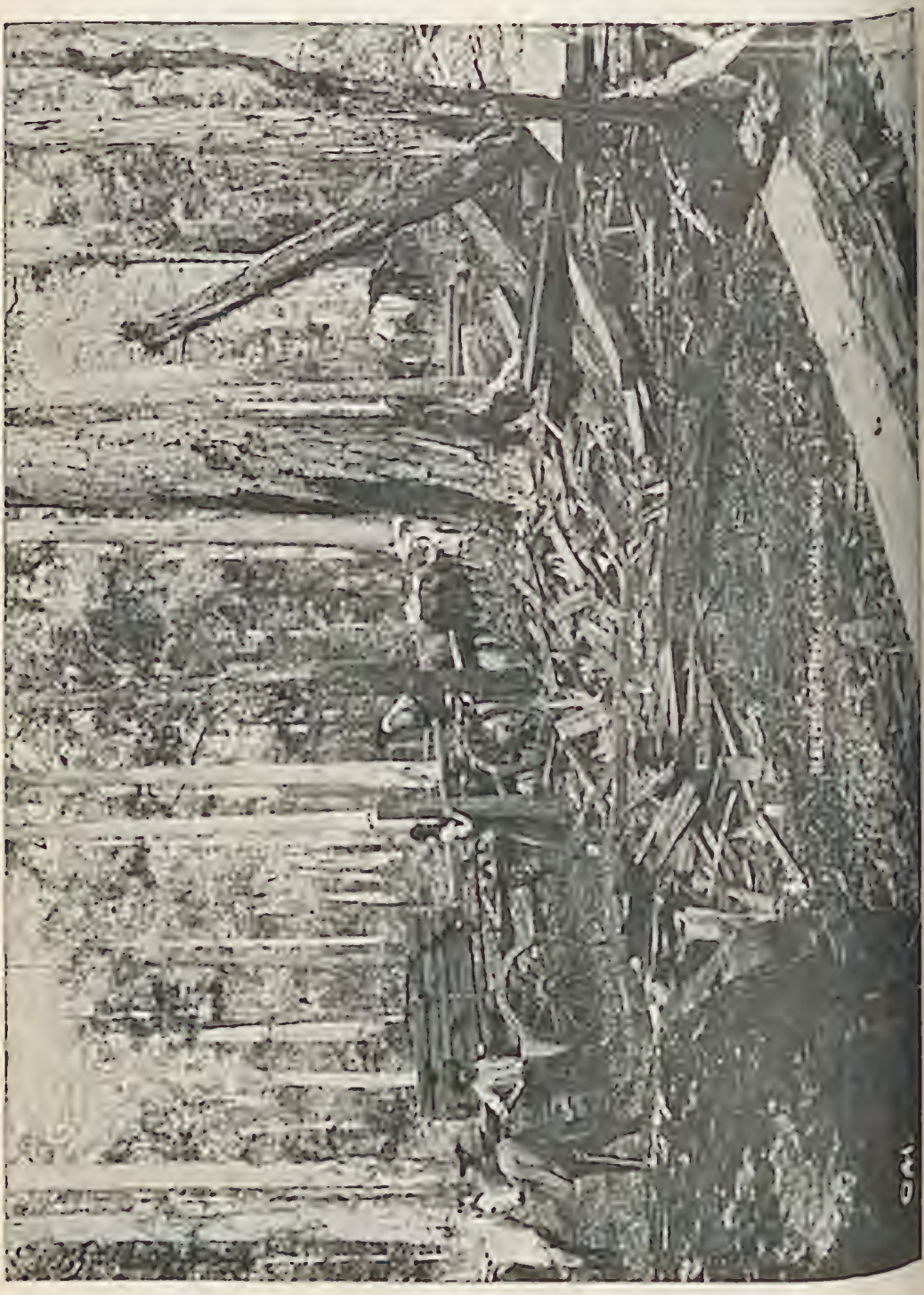
DR. W. MAXWELL, Director of the Experiment Stations and Laboratories of the Hawaiian Sugar Planters' Association, who, at the invitation of the Queensland Government, has lately been making inquiry into the present position of the Queensland sugar industry, has now furnished an exhaustive report on the matter to the Minister for Agriculture. The report, which deals with climate, soil, irrigation, pests, and diseases, and manufacture of sugar, concludes with certain recommendations which deserve all the attention due to so high an authority as our late visitor. The report is now printed, and copies may be obtained by those interested on application to the Under Secretary, Department of Agriculture.

SUGAR PRODUCTION OF THE WORLD.

IN a pamphlet entitled "The Sugar Cane," by Mr. Walter Tiemann (Sheik Fadl), published in Berlin, that gentleman estimates the total production of cane-sugar in the world at 6,741,000 tons, thus:—

	Tons.	
EUROPE—		
Spain		15,000 tons.
AMERICA—		
United States	230,000	
Mexico	70,000	
Central America	20,000	
Cuba	230,000	
Jamaica	32,000	
Porto Rica	66,000	
St. Domingo and Hayti ...	56,000	
Guadeloupe	42,000	
Martinique	32,000	
Barbados	56,000	
Trinidad	49,000	
Antilles	50,000	
Surinam	9,000	
Demerara	110,000	
Ecuador	6,000	
Peru	75,000	
Argentina	85,000	
Brazil	300,000	
	———	1,518,000 ,,

Plate CLXXXI.



VIEW IN THE BLACKALL RANGE.

Plate CLXXXII.

SLEEPER-GETTER AT WORK

	Tons.	
Brought forward ...	...	1,518,000 tons
AUSTRALIA—		
Queensland	96,000	
New South Wales ...	22,000	
Fiji Islands	35,000	
Sandwich Islands	203,000	
New Caledonia	1,000	
		357,000 ,,
ASIA—		
East India...	3,500,000	
China	200,000	
Japan	33,000	
Cochin China	20,000	
Philippines	228,000	
Java	556,000	
Siam	7,000	
Straits Settlements ...	15,000	
		4,559,000 ,,
AFRICA—		
Egypt	101,000	
African East Coast ...	45,000	
Mauritius	115,000	
Réunion	36,000	
Other States	2,000	
		292,000 ,,
		6,741,000 tons.

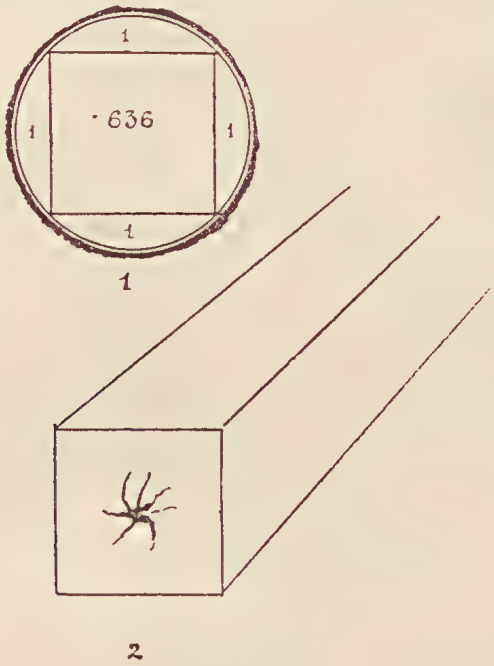
Forestry.

WASTE IN SLEEPER-GETTING.

By A. J. BOYD.

With the extension of our railways, the demand for sleepers has increased enormously, not only for new lines, but for replacing worn-out sleepers on the old railways. When it is considered that we have 2,797 miles of line working, and that further construction will soon be undertaken, it becomes evident that enormous quantities of sleepers are and will be required. Each mile of rail contains about 2,000 sleepers, and the demand gives employment to a small army of bush workers, who are hard at work all the year round, merrily denuding the forest areas, giving no thought to the time to come when suitable timber will be scarce or situated at long distances from the point of delivery. The business of sleeper-cutting is productive of as much waste as that of shingle-splitting, with the difference that the splitter rejects hearts and backs, and the sleeper-getter the hearts only, and not those even if he can get small sound trees which will furnish two or three sleepers from each seven-foot length. Ironbark is frequently "pipy," and care has to be taken to split the logs in such a way as to retain all the best outside wood, rejecting the unsound portion, which, however, usually contains very much sound timber, but not broad or thick enough for a sleeper. In this way quite one-fourth of a tree is wasted. Add to this loss the heads of the trees and often five or six feet of the trunk towards the head, and the waste will come to one-third of the whole. But there is an additional waste in the choppings when the sleepers are dressed. Finally, in the case of ironbark, there is the bark, which is excellent as firewood, and is largely used by wheelwrights for heating iron tires.

The loss in avoiding the heart timber is very considerable when large trees are converted into sleepers. A tree, which, theoretically—that is, according to its cubic contents—should produce 25 sleepers, will, in fact, do nothing of the kind. The utmost that can be reckoned on is from 13 to 14. As I am on the subject of dressing split timber, I may incidentally allude to the demand for timber for bridges, culverts, building beams, heavy telegraph posts, &c. Much of this is squared in the bush, and the choppings amount to a serious item. If we take a log of timber and denote the area of one end by 1, then the square within the circle will have an area represented by 0·636. The whole of



Figs. 1 and 2.

the wood outside the square is chopped away, and left till the next bush fire comes along and consumes it. This loss is represented by ·364 or nearly one-third of the log. Thus in every 100 cubic feet worked up for squared beams 33 feet are lost, and this the very best part of the timber, the doubtful heart being retained. In European countries there is very little waste. The choppings are either sold for firewood or are made into charcoal, whilst the heads and limbs are carefully collected and sold for the same purpose, or for work which will admit of short lengths being sawn into boards. The bark is also utilised for various purposes, such as the bark of the oak for tanning purposes. In this colony, nothing is utilised but the actual sleeper or log itself; the rest is simply woeful waste. Some years ago the price of sleepers was £12 per 100, but the price has dropped to-day to a little over half that amount. Much of the waste here alluded to would be avoided if all railway sleepers were sawn instead of split. If our remaining forests are to be conserved, this matter would be worth inquiring into.

THE CATALPA TREE (*CATALPA BIGNONIOIDES*).

A TIE and fence post plantation has been set out with 50,000 catalpa trees on a vacant farm near the central portion of Indiana, by the Cleveland, Cincinnati, Chicago, and St. Louis Railway. Mr. George W. Kithedge, M. Am. Soc. C.E., informs us that at the present time the road is using white oak ties, the average

life of which is about nine or ten years. Catalpa ties have not been tried to any extent, although a sample which was put in the track fifteen years ago was recently removed and found to be in a fair state of preservation as far as decay is concerned, but was considerably cut and worn by the action of the rail. It has cost on an average but 1 cent per tree to set the 50,000 acres, this expense including preparing the ground, cultivating the same, and building a considerable amount of fencing, in addition to the cost and transportation of the trees themselves.—*Engineering News.*

The particular tree here alluded to is probably *Catalpa bignonioides*, Walter, of the Southern States of North America, of which the late Baron von Mueller says in his work on "Select Extra-Tropical Plants" :—

It is a tree of rapid growth, in warm humid climates attaining a height of about 20 feet in four years. Professor Meehan observed the stem to attain a diameter of 4 feet in twenty years, even in the latitude of New York; rate of growth in the clime of Nebraska, as recorded by Governor Furnas, considerably less. . . . . When closely planted, it will grow tall and straight, with a stem fully 50 feet to the first branch. It prefers bottom lands, but will succeed in almost any soil and position, according to Mr. Barney. It is hardier than most Eucalypts, but will not stand severe frosts. According to Professor Burrill, it is not liable to be destroyed by insects; bears seeds when quite young. Professor Meehan considers the wood to be as durable as that of the best chestnut-trees; indeed, it lasts for an almost indefinite period. General Harrison insists that there is nothing like it for posts. Catalpa pickets of the old French Stockade are still sound. Logs thrown across watercourses for crossing have lasted for three generations; railway posts and platforms of this wood are almost indestructible. Logs a century old and posts half-a-century old were not in the least decayed (*Barney*). Railway cross-ties (sleepers) made of this wood are very durable, a tree twenty years old furnishing sufficient timber for four ties. Canoes made of catalpa wood never crack or decay.

A hardier and taller species is also mentioned by Baron von Mueller—the *Catalpa speciosa*. The growth of this tree is as rapid, and the wood is as durable, as that of *C. bignonioides*; it has only a thin layer of destructible sapwood. In forty years it was found to have attained a stem circumference of 40 feet at 4 feet from the ground. It might well be worth the while of the contemplated Department of Forestry in this colony, to make a plantation of these trees when the proper time arrives for adding to the number of our timber trees. It is to be regretted that the great Victorian botanist did not state specifically whether white ants are among the insects by which the timber is not likely to be destroyed. That is a point, however, which could soon be decided by importing a log and subjecting it to experiment.

FORESTRY IN SOUTH AFRICA.

Many of the members of the first Queensland Contingent who are now at the seat of war, in South Africa, have mentioned, in letters to their friends, the desolate appearance of the country on the line of march from Capetown to De Aar and also towards Kimberley. One writer says that he has travelled 591 miles nothward from Capetown to the Orange River, seeing scarcely any thing worthy of the name of a tree on the whole journey. De Aar (he says) is a large flat, almost surrounded by flat-topped and conical kopjes; and where not so surrounded, the country extends for miles in an unbroken plain, covered with the Karoo bush—a stunted growth, similar to saltbush in appearance, and very fattening to sheep, but "striking our men from the Downs or luxuriant sugar districts as weird and awful desert." Another says :—"So far, we have not been much impressed with this colony; but, of course, we have only seen the desert. The railway line passes right through the Great Karoo, and, as the season has been very dry, there is not much to be seen but rocky hills, great stretches of sandy waste with small saltbush shrubs on it."

It is not then surprising that we find Mr. G. H. Davies, a forest ranger of Qudeni, S.A., writing as follows in the *Natal Agricultural Journal* on the subject of afforesting the desert, and re-afforesting tracts of South African territory, laid waste by the natives :—

The inhabitants of a temperate climate and of an island of gentle contours, watered by a rainfall spread over all the seasons, require something more than mere precept to give them any idea of the real importance of forestry. In India, however, the necessity was too obvious to be passed over, and, once acknowledged, British thoroughness spared neither expense nor care in establishing there a splendid department of the Civil Service whose work is the admiration of the world. But it needed the object lesson furnished by conditions the exact opposite of those obtaining in Great Britain, in a vast continental region whose mountains, mothers of mighty waters, tower amidst the highest of our globe—feeding great rivers in a climate that passes from drought to deluge with an appalling suddenness—to teach the rulers from a favoured isle that by forestry alone can the conditions be equalised, the waters controlled and distributed, denudation stayed, and the parched plains given the moisture needful to turn them into feeders of the swarming nations of that tropical empire. Mechanical science has done much, but it can never supersede trees. No engineering can do what forestry can to curb torrential action; to turn nullahs, now dry and now mill-races, into streams of nearly even flow the year through; to change a land, subject to alternate drought and downpour, into one sufficiently humid at all times; to return to the atmosphere the oxygen burnt out of it. In forestry we may find the clue to the loss of empires more surely than in tales of long-forgotten wars. Vast tracts of sand cover Babylon and Nineveh, and many a great city of the past, not because the inhabitants were slaughtered and their buildings overthrown, but because the land was laid waste—the trees were cut down.

The ancient Asiatics were thorough in their destruction, and to the dwellers on the great plains forestry was a vital matter; it meant all the difference between aridity and fertility—between sand and soil. To those, however, in occupation of mountainous districts enjoying a heavy rainfall, forestry was not so obvious a necessity. Its function is the same in both cases—conservation of water—but it might well seem to the natives of hilly countries that the sooner their superabundance drained away the better. They would have so many trees that the latter would be continually in the way of their primitive agriculture, occupying the only spots their poor implements could work (as with our blacks), and destruction of forest would go on until the land failed the race. An example of this may be found in the Khanate of Great Bucharia, which, in 1826, was described by Malte-Brun in his "Universal Geography" as a land of the richest vegetation and agricultural prosperity. Fifty years later the same country was a mere desert, owing to "a mania for clearing having seized upon the inhabitants." [See *Queensland Agricultural Journal*, Vol. IV., Part 1, page 68.]

Between these two extremes, Asia and the Western Islands washed by the Gulf Stream, comes South Africa, with Natal as a more favoured portion. Ours, however, is not so favoured a land as France is in equality of the seasons as to moisture; and the recent experience of the European country, and its courageous and successful rebrosement, at an enormous cost, in repair of torrential action induced by the destruction of woods, may cause us to consider if a little care at the present will not save a huge bill in the future. We have come into possession of the country at a critical moment. For generations the natives have destroyed the woods, burning the old trees as they cultivated round them, and using the young ones as poles and wattles at the rate of about a thousand for each hut. In the steep ravines, however, and wherever the surface is too difficult and stony, patches of woods remain to guard the springs that, uncontrolled below, are carving the surface with dongas, and so ever increasing the rapidity and force of their summer flow.

Our first duty, therefore, is as obvious as it is cheap; we must preserve, above all considerations of timber or wood supply, these silent witnesses of the past, whether they consist of woods covering hundreds of acres, or of two or three shrubs guarding a mountain spring. The black, ever prowling for the material wherewith to build his inefficient and leaky dwelling, cannot in any case be too quickly taught to use other materials than young trees, for, unless conservation of woods is shortly enforced with great strictness, there will soon be none to supply the wattles required by an ever-increasing population of aborigines. Though we may grow wattles for them, we cannot keep pace with such a demand; while the legitimate thinnings of our largest bushes would hardly more than supply one small tribe. Forest destruction must be stopped now by force, or, in a very few years, by the lack of any woods to destroy. Discontent will have to be faced in either case, but in the latter it will be aggravated by a tacit confession of weakness on our part. Natal would have a far better right to be called the "Garden Colony" if she made a better use of her ample rainfall than to swell her torrents, and to wash away her punts and bridges. If our bare hillsides were clothed, or even partially girdled, with woods to stay the rapid surface-loss of the summer rains, permanent springs would arise, high upon their slopes, to supply in winter the water needed by lands far above the drainage level of the country. No engineering can do more than irrigate patches of land in Natal, because that drainage level lies low amidst mountains that shed their water like so many house-roofs; and the little that can be done must be costly, owing to the suddenness and violence of the freshets endangering the intake works of any canal, however well constructed. Our towns not only suffer directly from the alternation of superabundance and deficiency of water, through the bareness of the watersheds supplying them, but also from the mud washed into that water by every rain. The country is well washed at the expense of the citizens, who have to drink the soiled water and risk enteric fever every rainy season. Afforestation of the watersheds is the only real remedy—there is no filter like bush-humus, and, if it is of slow growth, all the more reason for preserving every scrap of bush we have left, while losing no chance of planting more.

There are land-owners in Natal who are both preserving their bush and extending it by plantations. Let their reasons be what they will, utilitarian or æsthetic, they are equally patriotic; but we must not lose sight of the fact that there are others who will not only "cut out" the patches they may find on their farms, but allow the kafirs to destroy what is left in order to keep near them a supply of labour. Such men are mere exploiters of the country, and it becomes a question if their actions with regard to bush should not be controlled for the good of the community. In the happier times we are all looking forward to, when peace again prevails, let us hope that any surplus funds may be devoted to the most permanent of all improvements of the country—afforestation.

FORESTRY IN SICILY.

The Sicilian Government long ago recognised the fact that the destruction of timber on hilltops and on steep hillsides has a most disastrous effect on the lands of the valleys below. On this head Dr. W. Schlich, late Inspector-General of Forests to the Government of India, says, "The next point for consideration is the effect of forests on floods, landslips, erosion," &c. If Great Britain and Ireland were situated in a more southern latitude, or removed from the sea, their configuration, especially that of Scotland and Ireland, would probably make afforestation a necessity. The upper part of the hill ranges is in many cases bare, and there afforestation might produce good effects, but it would never pay, and could only be justified on public ground if the damage done by the rushing down of rain-water was great. Damage by floods occurs in some parts, but it will be cheaper to meet it by engineering works than by afforestation of unpromising (rocky) steep hillsides.

In a paper read before the National Geographic Society, at Washington, by Mr. B. E. Fernow, the writer, alluding to the destruction of timber on the hill-sides, says:—"Man has by this action handed over the naked soil to the action of wind and water. He has accomplished ruin to himself, and turned the slopes back into inhospitable deserts. The waters in torrents have brought down the soil and *débris*, covering out of sight the fertile fields of thousands of toiling farmers in France. By the irrational destruction of the forest, first for the supply of timber, then through the careless use of fire, by the clearing for unsuitable farm use, by excessive grazing of sheep and goat, the mountain-sides themselves are not only devastated and made useless, but fertile farms for 200 miles from the source of evil are ruined by the deposits of the *débris*, and the population pauperised and driven from their homes."

All practical foresters are aware that the above statements are absolutely correct, and that millions are being spent in France and other countries in order to re-afforest such denuded areas.

Where forests are necessary to produce climatic and mechanical effects . . . a wise Administration will take measures to assure the maintenance of a certain proportion of the country under forest. This can be done, either by maintaining or constituting a certain area of State forests, or by exercising a certain amount of control over corporation and private forests. In most civilised countries corporation forests are under the control of the State. Private forests are free from control in Australia, in the United States, and in some countries of Europe. In Germany 33 per cent. of the forests are State property, corporations claim 19 per cent., and private persons 48 per cent. In Switzerland 4 per cent. are State forests, 67 per cent. corporation, and 29 per cent. private forests. In Sweden 20 per cent. of the forests are State property, and in Norway 12 per cent.; the remainder is mostly in private hands.

In Sicily the Government takes the whole of the wooded country under its protection. There are what are called communal forests, as well as private woods. The Forestry Department has the right to place any forest communal or private under the protection of what is called *lo vincolo forestale*, which means that neither the communal authorities nor the private owner can fell a single stick of timber until permission is given by the Government. If it should appear that the removal of timber is inimical to the public health, or to the welfare of the community in any way, the veto is at once placed on timber-getting. Now, one of the principal sources of revenue—indeed, the principal source—of the commune is derived from the sale of forest produce, and from the rents received for grazing areas. Acorns form no inconsiderable portion of the revenue. The revenue accruing from grazing rights is even greater than that derived from other sources on forest lands. In most communes (or, as we should call them here, "divisions," managed by the divisional boards) the inhabitants have the right to enter the forests and obtain firewood and such other timber as is necessary for communal works. Poor and wretched as the grass in these forests would seem to Australians, yet the grazing rights bring in large revenues.

We take as an example an estate midway between Messina and Catania, at the foot of Mount Ætna. This property belongs to the great banking firm of Baring Bros., in England. The land is occupied by four mountains, and has an area of 12,000 acres. It is planted with oaks of two kinds, walnuts, and sycamores. Formerly the walnut was used for making the felloes of wheels, and the latter were in consequence very expensive and heavy. It was found, however, that the sycamore was admirably adapted for the purpose, being lighter, more easily worked, and consequently less expensive. The Manna-tree (*Ormus Europæa*, or European Flowering or Manna Ash) is mainly used for spokes. The former timber is employed largely for railway sleepers, which are sold at 5s. each. This fact is worth noting. Our railway sleepers are 7 feet long, 10 inches wide, and 5 inches thick, and measure by volume $2\frac{2}{3}$ cubic feet. At 2s. per cubic foot, enormous revenue could be derived from our Australian forests. In 1898, 205,337 sleepers were sent from Western Australia for the

Cape and Orange Free State Railway. At Sicilian prices these would be worth over £51,000, or £21,000 more than the whole revenue of the Western Australian forests in 1899! Sleepers in Queensland are to-day sold at from £6 10s. to £7 per 100 delivered at the railway station; and of these 100, 14 must be squared for connection sleepers. At the above price the Western Australian sleepers would be worth, delivered, a little over £13,000.

The land on the wooded area of the Messrs. Baring's Sicilian estate is sown with wheat one year and maize the next. The land is then allowed to lie fallow for the next two years, and is let for grazing purposes. The revenue derived from grazing rents is much more than that obtained from wheat and maize crops, the latter returning 12,000 francs (£500), and the former 18,000 francs (£750) per annum). As timber forms also a source of revenue on the estate, it naturally annoyed the proprietors when they found the *vincolo forestale* suddenly applied to their private forest, which contains some 12,000 large trees; 4,000 of these trees were brought under the ægis of the Forestry Department. One reason, and without doubt an excellent one, was that the land bearing this timber was situated on hillsides having a slope of 30 degrees. The removal of the timber would be injurious to the hills themselves and eventually to the cultivated lands below. But a protest was naturally entered by the owners. Anyone or any commune can enter such a protest. Upon its receipt, a Commission of departmental officers makes its appearance; and after long negotiations, in the course of which liberal *douceurs* reach the forester's hands, it is discovered that there is really no necessity for the embargo, which is accordingly removed, and everyone is happy in the knowledge that justice has been done. One amusing instance occurred on the occasion of the visit of the Forestry Commission to inquire into a case of the application of the *vincolo*. All arguments had been exhausted, liberal "baosheesh" had been given, but all in vain. The principal man of the Commission was a highly aristocratic engineer, whom the British agent failed to convince, and who looked too important an official to take a bribe. The agent at last determined to at least make the attempt. He enclosed a hundred-franc note in a book, and, handing it to the engineer, said: "Look at page so-and-so, and if the arguments it contains do not convince you that I am right, then nothing will."

The engineer took the book and looked into the page named. In a minute or so he returned the book (minus the bank-note, of course), and said that he now plainly saw that he had taken a wrong view of the question, and the *vincolo* would be at once removed.

THE HEALTHFUL EUCALYPTUS.

Owing (says a Havana [Cuba] message to an American paper) to frequent recommendations to Governor-General Brooke of the eucalyptus tree as an anti-malarial agent, some investigations into the subject have been carried on under his orders. Attention has been called to the success obtained in cultivating the tree in the vast Campagna di Roma, Italy, where eucalyptus is now recognised as rendering the whole territory much less unhealthy. The city of Mexico is cited as another instance, where the Vigo Canal, the floating gardens, and other malarial districts are now well stocked with young trees, with the results that the places which were once marshy and unhealthful have been rendered dry and innocuous.

One recommendation says that the camp of the British troops in Jamaica, which was formerly malarial, has been planted with eucalyptus, the outcome already being a steady disappearance of marshy spots. The tree, which absorbs the moisture, grows very rapidly, often 10 feet in a year. The wood is valuable, and honey bees seek the flowers. The honey, it is said, contains important medicinal properties.

The Tree Department at Santiago de Cuba, now knowing of the investigations in progress under General Brooke's direction, recently made a request for

several thousand eucalyptus slips, the requisition being strongly endorsed by General Leonard Wood. The officials in charge of the yellow fever hospital planted several slips some months ago, and these are now thriving. It is believed that great good will result from the investigations.

Several years ago experiments with the eucalyptus tree were tried here, the result being satisfactory for the first four years, after which, it is said, the trees died, but the consensus of opinion among the medical authorities is favourable to a repetition of the experiment, which General Brooke will probably attempt at an early date on a large scale.

WOOD PULP.

IT is stated that a certain French daily newspaper uses annually the wood pulp of 120,000 fir trees, averaging 60 feet in height, and equalling the thinning of 25,000 acres of forest. The quantity of wood pulp imported into Great Britain is very large. In June of 1894 21,681 tons were received; in June of last year the quantity had increased to 27,180 tons—an increase of 5,499 tons. In the first six months of the year 146,752 tons were imported, and by the end of 1896 it is estimated that the gross amount received will amount to at least a quarter of a million tons. Foreign producers compete with each other in supplying the English market with the raw material, and enable the paper manufacturers to successfully compete with foreigners for the manufactured article.

FORESTRY NOTES.

OSIER CULTIVATION.—In Germany, upwards of 48,000 acres of swampy land are drained and used for the cultivation of osier willows, and more than 40,000 people are employed in this work and in basket-weaving.

ARBOUR DAY.—Professor Baccelli, Minister of Public Instruction at Rome, Italy, organised the "Festa degli alberi" or "Tree day," in order to instil into the minds of Italian children reverence for and a sense of the value of trees, and to stimulate the replanting of trees throughout Italy.

Statistics.

QUEENSLAND PRODUCTS IN BRITISH MARKETS.

LATEST WHOLESALE PRICES.

BUTTER.—Choicest colonial, 104s. to 106s.; finest, 102s.; choicest New Zealand, 102s. to 106s.; Choicest Danish, 124s. per cwt.

CHEESE.—New Zealand, 58s. to 59s. per cwt.; American, 57s. to 58s.

SUGAR.—£14 10s. to £15 per ton; Java, £12 per ton; German beet, 88 per cent., 9s. 3d. to 10s. per cwt.

MOLASSES.—5s. to 11s. 6d. per cwt.; Queensland, none.

RICE.—Patna, 14s. to 22s.; Java, 14s. 6d. to 20s. per cwt.

COFFEE.—Finest Coorg peaberry, 82s. to 140s. per cwt.; Ceylon plantation, 110s. to 120s. per cwt.; bold blue, 28s. 6d. to 30s.; Santos, 33s. 7½d. to 36s. 7½d.

ARROWROOT.—7½d. to 2s. per lb.; Bermuda, 2s. per lb.

Wheat.—28s. 6d. to 30s. per quarter; 3s. 7d. to 3s. 9d. per bushel.

Ginger.—Calicut, rough, 28s. per cwt. Jamaica: Finest, 110s. to 140s.; fair, 58s. to 60s.; fine, 90s. to 100s. per cwt.

Tobacco.—Prices for pipe tobacco on 1st January, 1900—Pipe tobacco:—Kentucky Leaf: Common to fair, 2½d. to 5½d.; coloury, good to fine, 7d. to 9d. Kentucky Strips: Common to good, 3½d. to 7½d.; fine, 8d. to 11d. Virginia Leaf: Common to fair, 2½d. to 6d.; coloury, good to fine, 8d. to 11d. Virginia Strips: Common to good, 4d. to 8d.; fine, 8d. to 12d. Cigar—Sumatra, 7d. to 5s.; Manila, 4d. to 4s.; Havana, 8d. to 5s.

Wine.—Fair red wine (Australian claret type) in bond, 2s. to 2s. 6d. per gallon; fine old quality, 4s. 6d. per gallon; ordinary London port, £10 per pipe of 110 gallons; Marsala, £12 per pipe of 96 gallons.

Green Fruit.—Apples, 17s. to 23s. per barrel; pears, no quotation. Pineapples, no quotation; oranges, 14s. to 21s. per box; grapes (selected), 40s. per barrel; good small, 18s. 6d. to 25s. per barrel.

Eggs.—Australian, 9s. 6d. to 10s. per 120; Irish, 15s. per 120; Danish, 9s. 6d. to 10s. per 120.

Honey.—British, 40s. per cwt.; colonial, 30s. per cwt.

Olive Oil.—£35 10s. to £36 per tun (252 gallons).

Timber.—Kauri pine is selling steadily at late rates. Fair business in cedar logs. General advance in values, except for New Zealand white pine, which is in moderate demand, although the rush for butter-box sizes is now over.

Wool.—Messrs. Dalgety and Co. report:—The first series of London wool sales for 1900 opened on 16th January. Opening prices were reported par to 5 per cent. lower as compared with closing rates of the November-December series. On 18th January, the market was weaker. Prices for the bulk of merino wool 10 per cent. lower. 22nd January, tone of market firmer. 26th January, sales closed firm without further change. As compared with the closing rate of November-December series, the present position of values is—Greasy super merino wools, 5 to 8 per cent. lower; other descriptions of merinos, 10 per cent. lower; fine crossbreds and other descriptions, par. Total available of Australian and Cape, including arrivals to 26th February, 144,000 bales, of which 87,000 bales were sold, leaving 57,000 bales to be carried forward to the next series to commence on 6th March.

Frozen Meat.—The latest quotations to the 17th February for the various descriptions of frozen meat are:—New Zealand mutton (crossbred wethers and maiden ewes): Canterbury, 3d.; Dunedin and Southland, $2\frac{13}{16}$d.; North Island, $2\frac{11}{16}$d. Australian mutton (crossbred and merino wethers): Heavy (over 50 lb.), $2\frac{1}{2}$d.; light (under 50 lb.), $2\frac{5}{8}$d. River Plate mutton (crossbred and merino wethers): Heavy, $2\frac{9}{16}$d.; light, $2\frac{11}{16}$d. New Zealand lambs: Prime Canterbury (32 lb. to 40 lb.), 4¼d.; fair average, 3¾d. Note: Quotations for lambs are nominal, as no New Zealand lambs are at present offering. Australian lambs: Prime, $3\frac{7}{8}$d.; fair average, 3¼d. Australian frozen beef: Prime ox, forequarters, 3¼d.; prime ox, hindquarters, $3\frac{3}{8}$d.; secondary, forequarters, 3d.; secondary, hindquarters, 3¼d. The above prices are the official quotations furnished by the Frozen Meat Trade Association. The basis of quotations is sales of lines of not less than 100 carcasses of mutton or lamb, or 25 quarters of beef. All the quotations for mutton are for average quality. Quotations for New Zealand and Australian lambs do not include sales of small lambs, or heavies, or inferior quality.

Bacon.—47s. to 52s. per cwt.

Hams.—36s. to 54s. per cwt. Irish: Special brands, 80s. to 90s.; fine, 74s. to 86s.

HIDES.—Queensland bullock (heavy), 6d. per lb.; light, 5⅝d.; cow, 5½d.; New South Wales light bullock, 5½d. per lb.; horse, 7s. to 9s. each.

SKINS.—Sheep, 10¾d. per lb.; lamb, from 1s. to 5s. each.

FURRED SKINS.—*Kangaroo*, 11d. to 1s. 3d. per lb. *Opossum*, 5s. to 5s 6d. per dozen; 5 to 10 per cent. lower for first blue fine and first red good to fine. *Wallaby*, 11d. to 1s. 3d. per lb.; prices have risen by 15 per cent. *Bear*, 7d. to 9¾d. each; prices higher by 15 to 20 per cent.

TALLOW.—On 6th January, mutton tallow, fine, brought from 29s. 3d. per cwt.; medium, 27s. 6d; beef, fine, 27s. 3d.; medium, 26s. 3d. per cwt.

HORNS.—Extra large, 52s. to 60s.; large, 40s. to 47s. 6d.; medium, 25s. to 35s.; small, 12s. 6d. to 20s. per 100.

BONES.—Shanks, round, £5 to £5 10s.; flat, £3 10s. to £3 15s.; mixed, £3 5s. to £3 15s. per ton.

General Notes.

PREPARING TREE HOLES.

IN digging holes for the reception of trees, most people dig the sides straight down, and make the hole narrower as they reach the bottom. The consequence is that the tender rootlets, having no room to extend, when they reach the comparatively smooth hard side of the hole, turn back upon themselves and either form hard knots or grow up towards the surface until they reach the softer upper soil, when they make a sort of straggling lateral growth. A glance at the coffee-plant roots illustrated in this number of the *Journal* will show the effect of roots meeting with hard substances in their downward growth, and the effect is much the same laterally. A Californian University professor calls attention to this simple matter, and says the proper way to dig the hole would be to have its sides perpendicular for the first shovel-length, and below that to dig on a slant under the sides, so that the bottom of a tree hole 3 feet in diameter at the surface would be nearly 4 feet. In such a hole the young rootlets, in spreading out, would be forced downward. A uniform rule should be adopted that the surface soil contained in the first shovel's depth ought to be laid on one side of the hole, and the richer surface soil can be placed about the roots where it can do the most good. If the uniform rule is adopted to throw the first shovel's depth of soil to the north of the hole, mistakes need never occur.

A LUMBER-DRIER.

THE object of this invention is to provide a means for stacking lumber so that heat passages or flues are formed within the body of lumber thus stacked, and heat may be passed directly therethrough. In conjunction with this is a truck having a swinging framework adapted to receive and hold the lumber, the framework being so journalled to the truck that it may be turned into one position for the purpose of loading, and afterwards turned to the position which the lumber is to occupy while being dried. The kiln is so constructed that, after the frame is loaded and the stack of lumber completed upon it, the stack is locked in place upon the frame with flues or passages formed by the piling of the lumber. The car or truck is then run into the kiln, and, fitting between the sides, the heat from the heat pipes or other source of heat passes up between these sides, and is by them directed through the flues or passages which are formed in the lumber, so that every part of the lumber is exposed to the direct

current of the heat. Suitable valves or gates are provided for the escape of the heat from the drying chamber, and these gates are so arranged that by opening certain ones the direction of the heating current will be changed and caused to pass through any part of the lumber stack.

THE KEI APPLE.

A humorous correspondent of *Garden and Field*, referring to this plant, says that the fruit is useful if used properly, and is an excellent fruit to grow where the suburban fruit pest "Larakina-diabolica-Devastatrix var Prigabus" is so prevalent that sweet fruits cannot be grown. Where the Larakina pest attacks the plant its thorns are strong enough to pierce even his thick sensibilities, although protected with the thickest armour of dirt and the greatest profusion of ruddy language. Should he, however, reach the fruit, and, attracted by its pretty orange colour, taste it, its intense acidity satisfies his longings at once, and the policeman may safely leave his retreat round the corner without fear of having to catch him for fruit-stealing.

HOME-MADE ICE.

A simple way to obtain ice in summer at an isolated farmhouse is to nearly fill a half-gallon bottle with water, add 1oz. of rectified nitre, cork closely, and let it down into a deep well of water for about four hours. By this time the liquid will be completely frozen. The bottle must be broken to procure the block of ice.

A VALUABLE DAIRY.

The *Texas Stockman and Farmer* says:—"An Australian has recently brought fifty cows from his own country to Manila, and started a dairy. He has demand for more milk than he can supply at 50 cents (Mexican) a quart. The first reserve United States Hospital pays him a milk bill of 2,000 dollars (gold) a month. These were the first cattle, except the water buffalo, ever brought to the Philippines, and the cost of the freight from Australia amounted to twice the value of the animals in the British colony. The water buffalo, besides supplying the natives with milk, is slaughtered for the meat, but very little is used in the Philippines. They are also the beasts of burden and family pet. The children will climb all over the animal, and it is as gentle as a kitten, except when it is very warm and the flies are troublesome; it will take a very sudden notion to run for the nearest river or mud pond, burying itself completely, and wallowing until covered with a coat of black, sticky mud, which serves to keep the flies from torturing it so effectively."

[We have tried to discover who this smart Australian is, but hitherto without success. £400 a month for one milk bill, with a sure pay like Uncle Sam, would, one would think, set a dairyman up for life in a couple of years without any additional sales at 2s. per quart.—Ed. *Q.A.J.*]

FARMERS READ TOO LITTLE.

There is no question but that farmers read too little. There are hundreds of homes that never saw a farm paper, so is it to be wondered at that farmers fail so often? The farm journals should be prominent in every farmer's home. Farmers too often under-estimate their own abilities and talents, and look for great minds and deep thought in men of other classes, but history tells us that some of the great and talented of the earth were reared on the farm. Then lift up your heads, despondent yeomen. Gather the fruits and till the soil, for He who planted the Garden of Eden has a reward for those who toil. It is only a narrow, conceited mind that looks down on a farmer because he lives in the country and works for a living. The man or woman who despises the labour the farmer does shows a want of common sense, and forgets that everything that is produced is the result of more or less labour.—*Martin's Home and Farm.*

TO PRODUCE LARGE CARROTS.

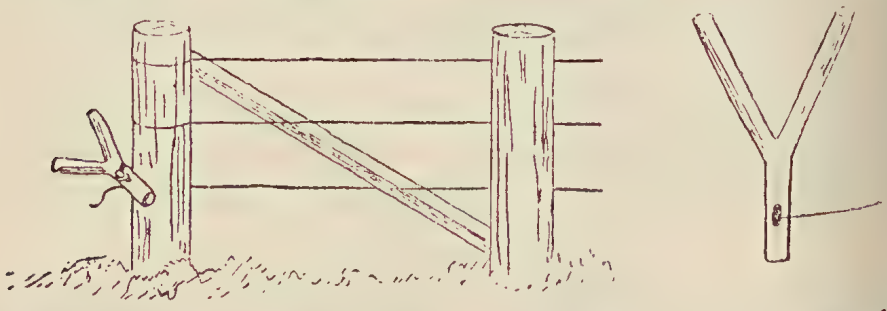
ONE of our exchanges has the following extract from the late Mr. George McEwin's "South Australian Vigneron and Gardener's Manual," which was first published in 1843:—Dig over the ground intended to be sown, mark off the rows, and stretch a line; then make holes 9 inches apart with a dibble, 3 or 4 inches in diameter at the surface, and gradually tapering to a depth of 18 inches. Fill up the holes with a rich, light, sandy compost, and sow three or four seeds in the centre of each. When the plants are nicely up and making growth, thin out, leaving the strongest plant in each hole. The carrots, if supplied with water, will fill the holes.

ACTION OF HEAT ON INDIARUBBER.

A WRITER in *Engineering* discusses the action of heat on indiarubber, a point of considerable importance, having regard to the extensive use of this article at the present time. There is a very prevalent misconception that indiarubber contracts when heated. The very reverse is the case—heat causing expansion, and cold contraction. With regard to the chemical action of heat on rubber, it is known to be injurious if at all high, or if the time of exposure is prolonged. That this action is some form of oxidation is taken for granted, though this is not definitely known to be the case. Rubber cannot be heated above 240 degrees Fah. without decomposition setting in; and even if this is not at once visible, it shows itself in a few days' time, or on exposure to light. The free sulphur, which is always present in mechanical rubber, is liable to oxidation into that destructive body—sulphuric acid; and this acts injuriously on the rubber when heated; hence it is difficult to apportion the blame properly in cases of decay. Rubber not only expands on being heated, but it gives out heat on being stretched—a fact which is easily demonstrated by stretching a piece of elastic thread quickly over the bulb of a delicate thermometer. Investigations made in 1891 by Gee and Terry into the specific heat of rubber found it to be ·48, which is identical with that of turpentine.

STRAINER FOR FENCING WIRE.

A QUEENSLAND correspondent of the *Australasian* sends to that journal a sketch and description of what would appear to be a very useful tool, especially for the bush, where other appliances are unobtainable. He says it is the simplest,



strongest, and cheapest of wire-strainers; merely a fork of a tree, with a hole to admit the wire. It will strain and break any ordinary wire used in fencing. The two handles can be made longer or shorter as deemed most convenient. Of course the longer they are the more purchase they will afford, and we can easily believe wires may be well tightened up thereby.

OLIVES IN ITALY.

MANY Englishmen have invested money in Italian olive groves. Italy's crop of olives is worth £22,000,000. Sixty trees are planted to the acre, and a full-grown tree will yield 190 gallons of oil, which sells at from 2s. to 3s. per gallon.

COST OF OLIVE OIL.

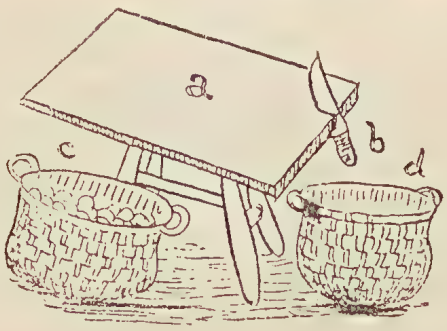
The *Mildura* (Victoria) *Cultivator* says :—

The cost of producing olive oil on a 20-acre plantation is as follows :—Interest on cost of machinery, &c., at 6 per cent., £15 ; picking, say, 25 tons at 3s. per 112 lb., and carting, £75 ; labour of man and boy in oil-room, £15 ; ploughing and digging, £20 ; incidental expenses, bags, &c., £7—total, £132 ; but call it £140. Twenty-five tons of olives will produce 875 gallons of oil, which at 7s. per gallon gives £306 5s. From this deduct £140 expenses ; and a profit is left of £166 5s., or £8 6s. 3d. per acre from a yield of between 43 and 44 gallons per acre.

Thus the cost of making a gallon of oil is about 3s. 2d.; and, therefore, the profit per gallon is 3s. 10d. net if the oil be sold at 7s. per gallon.

SEED POTATO-CUTTER.

The accompanying sketch and description of a labour-saving appliance we take from the *American Agriculturist* :—The preparation of no farm seed causes more trouble than that of the potato crop. It is a slow tedious task, and must be done by hand. This is usually done by placing the potato upon a board and cutting it in the size desired. Now this task may be greatly alleviated by the use of a device that I have already used. It is not new, neither is it my own



invention. It is simplicity itself, consisting only of a plank (*a*), 10 or 12 inches in width and 2 feet in length, and a knife (*b*) driven in one end equally distant from either side. This is placed upon a box or stool, and the operator sits astride it. At his right is placed a basket (*c*) containing the whole potatoes, and in front, just under the knife, is another basket (*d*) to receive them when cut. The potatoes are cut by being pressed against the knife, one at a time. At first the person cutting them need exercise a little care to prevent his fingers being cut, but with a little practice there will be no danger, and he can cut an amount of potatoes in an hour that would be impossible for him to cut in twice that time in the old way.

FARMING A PRECIPICE.

The Chinese are an industrious people, and nothing is allowed to go to waste that can possibly be utilised. As the Empire of China is the largest on the globe, and contains nearly half of the entire human race, the necessity for economy is very apparent. They not only cultivate the land, but all the lakes, ponds, and marshes are gardens in which aquatic plants, suitable for food, are largely raised. Among these the water chestnut is pre-eminent, and is said to be of a very palatable and wholesome nature. In a narrative of Lord Macartney's Embassy to China it is related that his lordship's attendants in passing through a part of that Empire saw a man cultivating the side of a precipice, and, on examination, they found he had a rope fastened around his waist, which was secured at the top of the mountain, and by which he let himself

down to any part of the precipice where a few yards of available ground gave him encouragement to plant his vegetables and his corn. The whole of the cultivated spots, which were at some distance from each other, appeared to be not more than half-an-acre, and near the bottom of the precipice, on a hillock, he had a little hut, where he supported a wife and several children in this hazardous manner.—London *Evening News*.

[The Chinese are not the only people who farm precipices. We have seen magnificent grapes in Switzerland, grown on almost inaccessible rock faces. The vines were planted in small baskets of soil fastened into crevices of the rocks and grew most luxuriantly.—Ed. *Q.A.J.*]

UTILISING GRAPE JUICE.

IT has been discovered that by importing pure grape juice in Kent (England) and employing a staff of expert champagne-makers from France, an article may be produced equal to many of the most expensive brands of champagne at one-third of their cost. This business has been entered into on a large scale, and the wine is sold in quantities at 2s. 3d. per large bottle and 1s. 4d. per half-bottle. It has been favourably reported upon by the greatest medical authority in the world—*The Lancet*. It goes under the name of "Onomosto," which signifies pure grape juice only.

SNAKES FOR THE PARIS EXHIBITION.

THE Portuguese barque "Atlantico," from Para to Brazil, has reached New Orleans with a cargo consisting entirely of snakes, valued at 50,000 dollars. They were gathered along the Amazon River, and include boa constrictors 33 feet long. They will be shown at the Paris Exposition. French snake-charmers own the collection, which represents the labour of twenty-five years spent in gathering the rarest specimens from America, Asia, and Africa.—*East African and Uganda Mail*, October 20.

AN INCH OF RAIN.

WHAT does an inch of rain mean? Few persons have a definite idea as to what is involved in the term. It may aid those whose opinion on the matter is not as fixed and positive as it might be to follow this calculation: An acre is equal to 6,272,640 square inches. An inch deep of water on this acre will be as many cubic inches of water, which at 231 to the gallon is 27,154 gallons. This immense quantity of water will weigh 228,190 lb. or 114 tons. One-hundredth of an inch (·01) alone is equal to over one ton of water to the acre.

TO CORN MUTTON.

TAKE 1 oz. of spice, 1 oz. of ginger, 1 oz. of nutmeg, 1 oz. of sugar, 1 oz. of whole spice, 1 oz. of cloves, 1 oz. of whole pepper. Put all in a mortar and break up (not too small); then put into a piece of muslin, and boil with 6 quarts of water, 1 oz. of saltpetre, and 2 pints of coarse salt. Let all boil for an hour, and then take up. When cold, put in your meat. Leave the bag with spices in the water. Let the meat stop in for three or four days.

TO MAKE GINGERBEER.

THREE gallons of boiling water, 2¼ lb. of sugar, 1½ oz. ground ginger, 1½ oz. cream of tartar, rind and juice of 2 lemons, 2 large tablespoonsful of yeast. Put the lemon, cream of tartar, sugar, and ginger into the boiling water; let it stand until just warm; then add the yeast and shells of an egg, also the white, well beaten. Stir well, and cover with a cloth. Next day skim, and pour the liquid off into another vessel, leaving the sediment behind. Bottle immediately, and cork well.

TO PICKLE CUCUMBERS.

Dissolve in hot water sufficient common salt and a small lump of saltpetre to make a strong solution. Then take sufficient water to make the quantity of brine required. In this place a raw egg (whole), and add the first solution to the water until the egg rises to the surface. Add to the brine cloves and chilies or cayenne pepper to taste. Prick the cucumbers with a fork, place them in a jar or tub ends up. Cover with grape leaves, then pour in the brine till the cucumbers are covered. Place a board over them weighted with a brick or any heavy substance to keep them under the brine. Cork or cover in such a manner as to exclude the air as much as possible. Let them stand for two or three weeks; and as they become sufficiently pickled (which will be known by their transparent appearance), remove them from the brine, cut them in suitably sized pieces, and bottle them in pickle jars. Fill the jars with cold vinegar. They will be ready for use in a day or two.

TO REMOVE WARTS FROM CHICKENS.

Scrape off the skin of the wart and carefully bathe the raw surface with hydrogen peroxide and water in equal parts. Dry and apply carbolated vaseline (1 per cent. of carbolic is strong enough).

GOOD MANURES.

For Potatoes.—3 cwt. superphosphate, 2 cwt. kainit, and 1 cwt. sulphate of ammonia. Mix before planting.

For Cabbages and Cauliflowers.—3 cwt. bonedust, 1 cwt. sulphate of potash per acre, followed by a top dressing, after the plants have recovered from transplanting and commenced to grow, of 1½ cwt. of sulphate of ammonia, mixed with soil and sprinkled round the plants.

TROCAR AND CANNULA.

The instrument, of which we give an illustration, is used in cases of bloating in stock for the purpose of allowing the gas collected in the stomach to escape. To use a trocar and cannula, proceed as follows: Tie the animal so it cannot get away. With a sharp knife make a small incision through the skin over the prominent part of the swelling on the left side. This incision should be made about half-way between the point of the hip and the last rib, and large enough to admit the trocar and cannula readily. The incision should be made quickly; then the animal will not notice it. The trocar and cannula are pushed quickly in and directed downward, inward, and forward until the flange of the cannula rests against the skin. Withdraw the trocar and the gas will rush out; that is, it usually does so; occasionally, however, the end of the cannula is plugged up with green food. This can usually be remedied by pulling out the cannula part way, or pushing the trocar in again and withdrawing it. If this doesn't work, tap the stomach again in another place, using the same hole through the skin. The escape of gas is usually accompanied by a small quantity of green food. If a trocar and cannula are not available in an urgent case, a knife can be used very successfully—a good-sized pocket-knife, pushed quickly through the skin and muscles in the same manner as described. Care must be taken that the edge of the knife blade is not turned towards the animal's tail, as they sometimes jump forward, and a much larger hole is cut than was originally intended.

WEEDS ON PATHS.

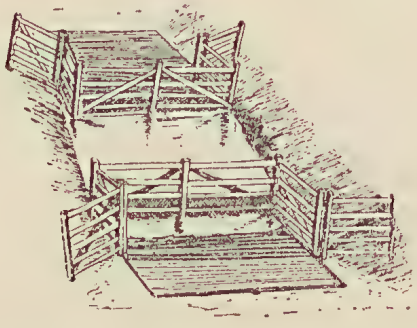
THESE may be destroyed without breaking up the paths by treating with hot brine—1 lb. salt to 1 gallon water; or 1 part sulphuric acid to 30 parts water; or 1 oz. carbolic acid to 1 gallon water; or 1 lb. powdered arsenic in 10 gallons water. To dissolve the arsenic, place it in 3 gallons cold water, bring up to boil and keep stirring, then while boiling add 7 gallons water and 2 lb. washing soda.

EXPERIMENTS TO PRESERVE TIMBER.

YEARS ago experiments were made at Geisenheim, by Professor Giseyius, of Koenigsberg, with 6 feet long poles from pines, to be used for vines, and it was found that several fluids were better for preserving than merely burning the ends. Oil of tar and carbolineum were found useless, inasmuch as the creosote in them gave that taste to plants growing near, and other fluids were too expensive. But a solution of 2 lb. or 3 lb. of bluestone was found to be cheap, easy to use, and well preserving. Later experiments were made in the Agricultural School at Dahme, and at the hop garden at Sussenthal with pine and fir poles, 24 feet long, and with fencing posts. The solution impregnates, and rises within three or four days to the top if you remove the bark from freshly cut stems and place the lower end into it. In trees cut some days before they are peeled and put into the solution, it rose only from 3 feet to 6 feet high. If it freezes this method cannot be used; the warmer it is the better. The casks must be very strong, and have to be filled up twice a day. For 90 hop poles, about 24 feet long, it required 6 lb. of bluestone.

GUARD FOR MUDDY WATERHOLES.

IN summer time, when the water becomes low in waterholes, stock often get bogged in the mud, and sometimes perish there. A guard has been invented by Mr. J. G. Docherty, which prevents the possibility of stock getting into the mud. Its method of application is explained by the accompanying diagram.



As the water recedes the guard can be moved further into the waterhole, and the water used to the last drop without the stock being able to get into mud. The guard can be made for holes with either one or four slopes. Where now in use they are giving every satisfaction.—*Australian Farm and Home.*

RUSTY NAIL WOUNDS.

TREADING on an upturned rusty nail sticking out of an old board is a very common accident. Children who are in the habit of running about barefooted are especially liable to such an accident, and fatal consequences often ensue, lockjaw and subsequent death being often the result. "Pansy" contributes to the *Australian Farm and Home* the following very simple remedy in such cases, which is at all events well worth a trial:—The remedy is simple, always on hand, and can be applied by anyone; and what is better, it is infallible. It is simply to smoke the wound, or any bruise or wound that is inflamed, with

burning wool or woollen cloth. Twenty minutes in the smoke will take the pain out of the worst case of inflammation arising from the wound. People may sneer at this remedy as much as they please, but when they are afflicted just let them try it.

PRICKLY-PEAR DESTRUCTION.

The *Queensland Grazier's* correspondent at Yeulba writes:—A few days since, at a neighbouring station, I had an opportunity of seeing how the arsenical solution acts on the prickly-pear. To make the solution, arsenic and soda are boiled in an iron tank. When the liquid has cooled, it is pumped into a similar tank set upon a dray, sufficient plain water being added to reduce it to the required strength. It is then carted to the scene of action, and, by means of watering-pots, liberally sprinkled over the pears, which have been prepared for their poison bath by having the outside leaves cut away from the main stem. This is done by men with long, sharp shovels, two men cutting sufficiently quick to keep one poison-sprinkler at work. In a few hours the plant begins to turn a yellow colour, and the following day emits a very bad odour. Finally it dries up so completely that by stamping on it one can reduce it to a fine powder. As to the danger to stock depasturing on country where the arsenical solution is being used, it is very slight. The change from succulent green to stringy yellow takes place very rapidly (except on those plants operated on very late in the evening), so that even a confirmed pear-eater can see nothing to tempt its appetite in a "treated pear." I was unable to ascertain the cost per acre of destroying the pear by this method, as sufficient country had not been operated on to enable one to form a correct estimate; also the chemicals had been obtained at a cheaper rate than usual in consequence of such large quantities—a ton of arsenic with soda in proportion—being ordered at one time. There is no doubt that the arsenical solution is a most effective mode of destroying the pest, and cheaper, where labour has to be paid, than the old method of rooting up and burning, but still too costly for the poor man on thickly infested country. Prickly-pear is an ever-growing evil which, unless checked, will ultimately ruin large tracts of country which otherwise, in view of the rise in the price of cattle, sheep, and wool, would become very valuable. We have not seen the results of the Government experiments in this matter published. It would be interesting to a great many.

[With reference to the above, we learn from Mr. W. Soutter, Inspector of State Farms, that upwards of 40 acres of the prickly-pear have been treated at Jondaryan by Messrs. Kable and Adams and the results are very satisfactory. The "Prickly-pear Destroyer" bids fair to completely destroy the pest without the enormous labour and expense which other methods entail.—Ed. *Q.A.J.*]

ARMY MEAT RATIONS.

Some surprise has been expressed at the enormous quantities of meat, in various forms, which are being shipped from Australia, the United States, and Canada to the seat of war in South Africa. It is not generally known that an average-sized bullock furnishes meat rations for 300 men for a day. A sheep will satisfy the wants of 45 men, whilst a pig will yield 110 dinners. If the British army consists of 200,000 men, it requires, to supply their daily food, 666 bullocks, 4,444 sheep, or 1,818 pigs, irrespective of other articles of diet. There should thus be an excellent market for meat-producers for some time to come.

PROTECTION OF BIRDS IN UNITED STATES OF AMERICA.

An appeal has been issued by the United States Department of Agriculture for the observance of a "bird day" in the public schools throughout the country, that children may be instructed in the value of birds, and the means of protecting them from wanton destruction.

TO PRESERVE VEGETABLES.

PEAS.—Boil the peas with plenty of water ; add a little salt. When tender fill the bottles with boiling peas and water, and seal at once.

TOMATOES.—No. 1: Have a boiler with water and a little salt in it boiling; put in the tomatoes and boil for five minutes ; fill your bottles or cans with tomatoes ; then fill with the boiling water to the neck. Screw on the covers at once. No. 2 : Place the tomatoes in a basin, and pour boiling water over them; then peel and place them in a false-bottomed steamer, without water, and let them steam for 15 minutes. Fill the cans or bottle to overflowing, and seal quickly.

AGRICULTURAL AND HORTICULTURAL SHOWS.

THE Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respective shows, notify him of the date, and also of any change in date which may have been decided on.

The Markets.

AVERAGE PRICES FOR JANUARY.

Article.		JANUARY. Top Prices.		
		£	s.	d.
Bacon	lb.	0	0	7
Bran	ton	4	19	4½
Butter, First	lb.	0	0	9
Butter, Second	,,	0	0	5⅜
Chaff, Mixed	ton	3	6	3
Chaff, Oaten	,,	4	0	0
Chaff, Lucerne	,,	3	1	10½
Chaff, Wheaten	,,	2	12	6
Cheese	lb.	0	0	5
Flour	ton	8	4	3
Hay, Oaten	,,	3	7	6
Hay, Lucerne	,,	2	0	7½
Honey	lb.	0	0	1½
Rice, Japan (Bond)	ton	15	12	6
Maize	bush.	0	4	1½
Oats	,,	0	3	6½
Pollard	ton	5	6	10½
Potatoes	,,	5	1	3
Potatoes, Sweet	,,	1	12	6
Pumpkins	,,	2	10	0
Sugar, White	,,	15	10	0
Sugar, Yellow	,,	12	5	0
Sugar, Ration	,,	10	7	6
Wheat	bush.	0	3	5
Onions	cwt.	0	4	9
Hams	lb.	0	0	10⅕
Eggs	doz.	0	0	10⅝
Fowls	pair	0	3	6¾
Geese	,,	0	5	9
Ducks, English	,,	0	3	1½
Ducks, Muscovy	,,	0	4	7½
Turkeys, Hens	,,	0	7	4½
Turkeys, Gobblers	,,	0	15	6

ENOGGERA SALES.

Article.	JANUARY. Top Prices.		
	£	s.	d.
Bullocks	7	14	4½
Cows	5	11	8
Wethers, Merino	0	13	9¾
Ewes, Merino	0	8	10½
Wethers, C.B.	0	12	4½
Ewes, C.B.	0	10	6
Lambs	0	10	3

Orchard Notes for March.

By ALBERT H. BENSON.

THE citrus season is now commencing. Early oranges will be ready to ship from the Maryborough and Northern districts during the month, for, though they will not have developed their full flavour, the Southern markets are bare of any main crop citrus fruits, and our oranges, in consequence, meet with a ready sale. Citrus fruits should always be cut, not pulled from the tree, and should be handled as gently as possible. They should be carefully graded for colour, size, and quality before packing, and should be firmly packed so that there is no danger of bruising during transit, as slackly packed fruit always bruises more or less badly. Early fruit usually carries well, as the skins are fine and tough, and not nearly as soft and brittle as they become when the fruit is fully ripe, so that with ordinary care they should reach the Southern markets without loss and in first-class condition. Main crop lemons should be getting ready to cut, as, if allowed to remain on the trees too long, they only become coarse and worthless for storing or shipping—in fact, only of value for preserving. Main crop lemons cure and keep well, the only secret in the curing being to cut the fruit at the right stage, which is usually just as it begins to get the first tinge of yellow, to handle it carefully so as to prevent bruising, and then to store in a darkened place having an even cool temperature and only moderate ventilation, but the store must not be too damp. Lemons gathered at the right time, carefully handled, and properly cured will keep for months, and will always bring more money than if they are allowed to remain on the trees till they become coarse and over-ripe. Strawberry planting can be continued during the month, advantage being taken of any dull showery days for setting out the plants. Where new orchards are to be planted the ground should now be under preparation, as if new land is to be planted it is advisable to allow it to become well exposed to the air, so as to sweeten it, and render it friable for some time before the trees are planted.

Dead or superfluous trees can be removed during the month; and when replanting on the same spot is desirable, then the hole from which the dead tree has been taken should be left open, and the soil left exposed to the action of the air, so as to sweeten it before a fresh tree is planted in the same spot.

Keep the orchards well cultivated, and fight insect and fungus pests whenever and wherever found. Look out for the fruit fly, especially in guavas, as if the infected fruits are carefully gathered and destroyed it will prevent a large number of flies from hatching out and destroying mandarins, cumquats, and oranges. The best remedy will probably be to spray the fruit, before it begins to colour, with Paris green, 1 oz. to 10 gallons of water, adding a little lime to the water to make the poison adhere better. The peach moth is becoming very common, and is doing a large amount of damage to all kinds of fruit, and, like the fruit fly, it would be kept considerably in check were the destruction of fallen infected fruit properly carried out, as a large proportion of the larvæ would be destroyed with the fruit.

Farm and Garden Notes for March.

Farm Notes.—Continue to plough up land. Sow lucerne, clover, rye-grass, oats, barley, vetches, prairie-grass, wheat, sorghum, carrots, mangolds, and Swede turnips. Plant the main crop of potatoes, and if the weather be favourable get this work done by the middle of the month. The weeds will now be slackening off in their vigour; it is therefore an excellent time to get in lucerne, on well-tilled friable soil. The land should have been prepared some time previously, by ploughing, cross-ploughing, and harrowing to destroy as many weeds as possible. If weeds should appear after the plants are well up, mow the field. This will give them a chance to get well ahead of the weeds. The land should be harrowed and rolled after mowing. Gather all ripe corn (maize), and cut tobacco as it ripens, wilting the leaves on the ground before hanging up to be subsequently dealt with according to the instructions of Mr. Neville, published previously in this *Journal*.

In Northern Queensland, plant granadillas for crop; also water-melons, opium poppy, and buffalo-grass; continue planting sweet potatoes, and make early plantings of tobacco. Plant anatto, kola nuts, Jack fruit, cow-pea. Trash sugar-cane. The work for April in this portion of the colony will be the planting of some temperate zone vegetables: Egg-plants, tobacco, English potatoes, bananas, and coffee. Harvest paddy. Keep the yam patches clean. Harvest Kafir corn. Keep down all weeds.

Kitchen Garden.—Weeds will still continue to give trouble, notwithstanding the fact that the summer will have ended on the 20th of March. Keep them down by constant deep hoeing. This will be a very busy month with market gardeners. Get the soil into fine tilth, and plant out cabbages, cauliflowers, Brussels sprouts, celery. Sow broad beans, peas, turnips (Swede and white stone), carrots, parsnips, onions, beet, spinach, and radish. These may all be sown in drills 2 to 3 feet apart. In transplanting, be careful to retain a ball of earth at the roots of the plants when lifting them. In planting cabbages on a slope, make the rows across the hill. Dress asparagus beds with salt. Make fresh sowings of beetroot, cauliflower, cabbage, endive, lettuce, leeks, parsley, and plant herbs of all sorts. Plant potatoes; transplant eschalots. Beetroot requires a rich, deep, open soil. Nearly all European vegetables can safely be sown in March. If the young plants are attacked by grubs, spray with Paris green. Tobacco water is also an excellent destroyer of grubs and slugs. For the great slug, *Vaginula*, described and illustrated by Mr. H. Tryon in this *Journal* (Vol. V., p. 63, July, 1899), tobacco waste from the factories is a certain remedy. It is obtainable at 5s. per load, and in addition to its value as an insecticide it is an excellent fertiliser. The tobacco waste may be laid on the surface of the soil in the form of a ring about 3 inches wide round the bed it is desired to protect.

Horticultural Notes.

By PHILIP MAC MAHON,
Curator, Botanic Gardens, Brisbane.

VEGETABLES.

THERE is, I think, no more pitiable sight in Queensland than the neglected appearance of the gardens of so many of our bush homes, when with energy and forethought there could be raised around everyone of them sufficient vegetables of the very choicest kinds to place upon the table of the poorest—luxuries only attainable in less favoured lands at great expense.

Few of those to whom a supply of fresh vegetables is a daily necessity realise the debt they owe to venturesome men who first introduced them from distant lands, and to patient laborious men who acclimatised them, and, chiefly by painstaking selection and skilful cross-fertilisation, improved them and made them fit to endure the changing climatic conditions of their new homes. A short list of the original homes of some of our principal vegetables will prove interesting:—Bean, Persia; beet, Southern Europe; broccoli, Italy; Brussels sprouts, Belgium; cabbage, Britain; carrot, Britain; cauliflower, Cyprus; celery, Britain; endive, East Indies; Jerusalem artichoke, Brazil; kidney bean, India; kohl rabi, Germany; leek, Switzerland; lettuce, Asia; onion, Africa; parsley, Sardinia; parsnip, Britain; pea, Levant; potatoes, Peru; radish, China; rhubarb, China; salsafy, Britain; sea kale, Britain; spinach, Northern Asia; tomato, South America; turnip, Britain.

So you see that the inmates of your kitchen gardens are much-travelled plants; and in coming here to Queensland with the descendants of sturdy old Crusaders and conquerors who so long ago tore them from their native homes, they are, many of them, finding climate and soil more like those which their progenitors lived in. And they show it. For some years I judged at some of the greatest horticultural shows in England—at Manchester, Birmingham, Leeds, Sheffield, York, &c.; but I have never seen anywhere vegetables as fine as some which I have seen at horticultural shows in Queensland. A pity it is that those who grow such magnificent vegetables do not learn the art of presenting them for exhibition in some more artistic manner. It is quite a common thing to see splendid dishes and collections of vegetables quite spoiled from want of ordinary care and taste in the staging. When will the grower learn—as in the older countries he has been taught by that greatest of schoolmasters, competition—that the buyer judges largely by look, and that quality with an uninviting appearance is often passed by for mediocrity with a tasteful exterior. Beauty and virtue in a Cinderella garb are all very well, but most people, out of a fairy tale, pin their faith to a smart frock.

A few brief notes on the vegetables which you may sow in the month of March will interest you. The quantity of seeds usually allowed per acre of the vegetable garden is given under each head, but, of course, this will vary greatly in different cases, and the information is only given for the benefit of the tyro. Thus a beginner starting with a garden of one acre which he intends to devote to vegetables would not be far astray in procuring the quantity of each kind mentioned below.

Some vegetables are sown in the places where they are to finally grow and produce a crop, but many are best raised in seed beds and transplanted, and the preparation of the seed bed needs a good deal of care. The soil should be friable sandy loam, deeply cultivated, very clean—that is, free from roots or seeds of weeds or other plants. It should be made fairly rich with thoroughly rotted manure and leaf mould. It should not fall away readily from the roots of seedlings when they are lifted, but above all it must not be clayey, so as to

form a hard-baked surface when it rains or when the watering pot is used. Arrangements should be made to shade the beds until the young plants are up—not with a dense dark shade, but with some contrivance which will allow broken sunlight to fall upon them. Nothing answers the purpose so well as a kind of make-shift bush-house, where you can increase the amount of light over any particular part by simply removing a few branches. A few forked sticks will do for supports. If you do not remove the shade as soon as your seedlings are up, they will get spindly, because it is their nature to seek the light, and if it will not come to them they will do their little best to go to it; and if there is one thing which you can count on in vegetable growing, it is this: That a weak seedling will never make a satisfactory plant. In this country you will find it a good plan when you have sown your seeds, to cover them with a thin covering of finely sifted leaf mould. All seedlings love leaf mould. It is their natural covering in the great majority of cases. Even in seed beds I like to see seeds sown in drills. It looks smarter. You can more easily detect weeds, and you can stir amongst the young seedlings with great benefit to them, and with corresponding discomfort to the host of weeds which will strive to be in at the feast of good things you have provided for your seedlings.

Beans (Broad).—This very nutritive vegetable likes a deep, stiff, well-cultivated soil, well drained, and with plenty of manure worked in. Mark out your rows 2 feet apart if the variety is dwarf, and up to 3 feet apart for tall sorts. Set each seed about 5 inches apart in the rows. They are often sown in double rows, zig-zag fashion, each seed being about 5 inches from its neighbour, and in this way they do well and serve as a mutual support. About 4 quarts of seed is the usual allowance for a garden of 1 acre. Broad Windsor, Early Long Pod, and Johnson's Wonderful are favourite sorts.

When your crop of beans have set, pinch out the centre of the plants to make them throw all their energy into the business of maturing the beans.

Beans (Kidney).—These, like the former, are, of course, to be sown where they will bear. I mention the fact because I have known a beginner to sow them in a seed bed. Years ago, in Europe, I raised them in pots under glass, and planted out in rows to dodge the late frosts. They like lighter, warmer soil than the broad sort, and both this and the broad bean will well repay watering with liquid manure. The most marvellous bean crops I ever saw were irrigated with sewage during the growing period of the plants. Two quarts may be allowed for a one-acre garden. They should be sown, like the broad beans, in rows about 2 feet apart for the dwarf kinds; and for the tall climbing kinds, which you will have to accommodate with stakes by-and-by, you may allow 3 feet. Let your seeds be set 6 inches apart in the rows; cover about 1 inch deep; and when the plants get a few inches high, hill them up on either side with a hoe, or on a large scale with the Planet Junior or other cultivator. This helps to retain moisture from watering, rain, or irrigation, and acts as a support to the plants.

Varieties.—Dwarf sorts: Bush Lima, Canadian Wonder, and Governor Denison are approved sorts. Climbing sorts: Large Lima, White Dutch, and Golden Butter.

The Soja Bean (*Soja d'Etampes*), which grows to a height of about 20 inches, is a most useful vegetable.

Beets.—If there is a country on earth whose people ought to relish the cooling salads which the climate produces in such abundance, that country is Queensland. Purple, Crimson, and Silver Beets make beautiful salads, and are greatly relished. The seeds are to be sown where there is abundance of sunlight, and in the position where the plants are to mature. If you want really first-class beet, your soil must be trenched a couple of good spades deep, digging the manure well into the bottom layer in order to induce the tap roots to go down after the food which they take up in large quantities, beets being an exhausting crop. Mark out rows about 18 inches apart, scatter a little fine soil along these

rows, and sow your seed in these, bearing in mind that you will have to thin the seedlings out to about 9 inches from plant to plant. The seeds should be steeped for about twelve hours in water at a temperature of about 60 degrees. This is not only to be recommended in the case of beets, but for many other vegetable seeds as well; indeed, any seeds with a tough coat will be all the better for it. Sow the seeds while still damp, and cover from 1 to 1½ inches.

You may, if you choose, sow beets in a seed bed and transplant them when about 2 inches high; and when only a few are wanted for a small garden, this is perhaps as good a way as any. In planting allow about a square foot to each plant.

The varieties are:—Blood-red, Champion-red, Turnip-rooted, for salads; and Silver for the stalks of the leaves, which are used as a vegetable. You require 2 oz. of seed for an acre garden.

BROCCOLI.—Some magnificent plants of broccoli have been grown in this colony—better than any I have ever seen or heard of before. It is a native of the Mediterranean coast, and no doubt finds itself somewhat at home amongst us, though it will not thrive during the hot summer months. It likes a rich, deep, light soil, and will not succeed on soil previously exhausted by a crop of the same family (Brassicaceæ). The seed bed should be light, rich, and friable in texture, and should not be shaded by trees. The seedlings must be grown without a check, and require plenty of water, as indeed do the plants at all stages. Choose a damp day to plant out, and then do so at a distance of from 2 feet to 2 feet 6 inches. Adamson's Early White, Grange's Early White, and Elletson's Mammoth are good varieties. You want 2 oz. of seed for an acre garden.

BRUSSELS SPROUTS.—This is a vegetable for poor soils, especially in this climate. The small compact heads or sprouts produced from the axil of every leaf, and remaining when the leaf has fallen away, have, when well cooked, a nutty flavour peculiarly their own, which one soon comes to appreciate. Heavy manuring destroys this flavour, and loose insipid sprouts are formed, very inferior to the usually delicate crisp ones. The seeds may be sown in an ordinary bed, and the seedlings planted out in rows 18 inches to 2 feet apart. About 2 oz. of seed is the allowance for an acre garden.

Varieties.—Rosebery, Scrymger's Giant, Exhibition.

CABBAGE.—This colony produces magnificent cabbage, but there seems, if one can form any idea from those exhibited at shows, to be a tendency to go in for mere size, without any reference to the qualities which constitute a good cabbage. This vegetable should be judged—(1) According to quality: the leaves should be thick and succulent, they should lie very close to each other, and be very closely turned in. (2) According to form: the head should be in the form of a cone, not flat. (3) According to size, weight, and firmness. Until some uniformity is observed in judging at our exhibitions, no one has any idea what kind of an exhibit is likely to secure a prize. Cabbage loves a deep, rich, open ground. It thrives where there is plenty of manure, and John Chinaman's success with "cabbagee" is due to the fact that he recognises the necessity for the water ration being on a very liberal scale. Sow your seed bed broadcast, or in drills. I prefer the latter. Cover slightly (a quarter of an inch or so) with sifted leaf mould; water gently, but thoroughly. When your plants are 3 or 4 inches in height, transplant them into their final quarters in rows from 18 inches to 2 feet apart, according to the size of the variety. Your garden of one acre requires about 4 oz. of seed. The favourite variety for exhibition purposes in England is Early York; this is a rather small cabbage, but of superior quality. Varieties grown here are—Large York, St. John's Day, Anderson's Improved, Early Jersey, Wakefield, London Market, Enfield Market, Sugarloaf, Drumhead (rather coarse), Flat Dutch, and Red Pickling.

CABBAGES (SAVOY).—At an exhibition at Beenleigh some little time ago I saw some really good Savoy cabbages. They are, when well grown, one of the very best table vegetables. The method of cultivation is the same as with the

ordinary cabbage. Dwarf Green, Curled, and Drumhead are the varieties usually grown. In planting out all cabbages, and particularly Savoys, examine the roots of each plant, and if the roots are clubbed or diseased burn them.

Carrots.—These like rich, free ground, but not fresh manure. Land which has been heavily manured for a preceding crop, and in which the manure is evenly distributed throughout the entire soil, will grow good clean carrots. For the table these should be young and without core, and this can be secured by making successional sowings. Get the surface of your ground fine, draw shallow drills 10 inches apart. Mix your seed with sand so that it will scatter well, as uncleaned carrot seed is apt to stick together; thin to 6 inches apart; and when large enough for use pull every alternate one for table, and those left will mature. Early Shorthorn, Scarlet Shorthorn, Intermediate, and Large Altringham are good varieties. You may allow 8 oz. of seed for your 1-acre garden.

Celeriac.—A kind of celery which has a turnip-like root, which is very largely used as a composition of salads on the Continent of Europe. It grows well here, and requires the same treatment as celery, with not so much attention in the matter of earthing up. The roots can be stored for a considerable time, and then form a good substitute for celery.

Celery.—This is a vegetable which requires a good deal of care to grow well, and, as nearly everyone likes good celery, and the inferior article is mostly abominable, it is worth while to take a little trouble over it. You cannot become a good celery-grower by reading this note, but you can learn how to set about getting your experience. A good dish of celery in a collection of vegetables at an exhibition is, or ought to be if it is properly judged, its strongest point. Celery should be judged according to—1. The length and girth of the blanched part. 2. The solidity and crispness of the stalks. 3. The flavour, which varies very much, a rich, nutty flavour being preferred. Celery, the centre of which has become hard preparatory to the production of flower, should not, as I have frequently seen here at shows, be awarded a prize, no matter how meagre the competition. It will pay you to make up a bed or box especially for celery-sowing. It should be a mixture of fine loam, leaf mould, and sand. Sow the seeds thinly, cover very lightly, and water well; slightly shade. Before the seeds are up you must have a bed ready, and into this you should dig plenty of well-rotted manure. When your seedlings are large enough for you to handle them conveniently, plant them into this new bed at least 6 inches apart. Spread the roots nicely out, and give them a fair chance of proceeding without any check. Slightly shade until they recover, and keep them well watered. In this transplanting, grade your plants so as to get the strong ones all together, the weak ones coming on for another transplanting afterwards. For the final quarters throw out of good land some trenches 12 inches deep and 15 inches across, with a space from trench to trench between of 4 feet. Heap the stuff you take out on each side of the trench. Then throw in the bottom of the trench good rotten manure to a depth of 6 inches, and dig it in with a fork. Then thoroughly water, allow to dry for twenty-four hours, and plant your young plants, taking care to do so with a trowel or handfork and not to knock the soil away from the roots. Water again thoroughly, and they will soon begin to dry. Now, if you grow for exhibition, take a piece of stiff brown paper and make a collar or case, and wrap it around the lower part of your plant as you would wrap a bottle, leaving the top free. As the plant grows, this can be lifted up and always kept above the earth (which you must heap up around the plant as it grows), thus preventing injury to the hearts. Plenty of water is the rule, and liquid manure may be given, but you can overdo this, as too much food makes celery rank and flavourless. Drought will make your plants "bolt" or attempt to flower, and this will spoil them for table and exhibition. A little salt sprinkled over the soil twice or thrice, followed by a watering, is good for them. One ounce of celery seed will meet the requirements of a 1-acre garden.

CRESS.—Frequent sowings should be made of Triple Curled Cress in any light soil in a box or bed. Of course, you know that the use of this is as a salad, and a most healthful adjunct it is to the table. If you mean to keep up a constant supply of this, you will have to lay in a quart of seed, and it will only be necessary to sow a small quantity at a time.

ENDIVE.—This capital salad vegetable is not so much grown as it should be. It requires to be sown in a rich seed bed, and transplanted out in lines 18 inches apart with 1 foot between the plants. While the plants are growing they will be improved by watering with liquid manure. When full grown, the plants should be blanched. This is done for exhibition purposes by covering them with some opaque vessel, such as a large flower-pot, about a fortnight before they are wanted. They are blanched in large numbers by tying up the outside leaves around the heart, so as to exclude the light and air for a fortnight or three weeks before they are cut.

One and a-half ounces of seed will suffice as a fair proportion for your garden of 1 acre.

ESCHALOTS.—Any light well-drained soil will suit these. Beds 3 feet wide should be thrown up with alleys between. Then plant sets, which are like small onions, in drills 9 inches apart, and 9 inches from set to set. Gather when bulbs are ripe, and select strong bulbs to plant again.

HERBS.—Every garden should have a herb border. This should be laid off in small beds about 3 feet wide, and each should have its own herb grown in it. The principal in use are:—

Angelica (Angelica archangelica).—Sow in the plot where it is to grow, and thin out to 1 foot apart.

Balm (Melissa officinalis).—Chiefly used in the manufacture of a cooling and anti-febrile drink. It can be propagated from the cuttings with a piece of root attached or from seed.

Basil (Ocymum basilicum).—Sow in a seed bed or box, and plant out 12 inches apart.

Betony (Betonica officinalis).—Propagate by divisions. Not much used.

Borage (Borago officinalis).—Champagne cup and claret cup, so much in evidence at social events, can hardly be said to be correctly made without the presence of Borage, but I do not remember to have seen it used for that purpose in this country. It grows wild in England, and is a very pretty plant, with a sky-blue flower. Sow and thin out to 9 inches apart.

Camomile (Anthemis nobilis).—A famous old-fashioned remedy in fevers, &c. The flowers are used. They are got from seeds, but better from divisions of the plant. Will grow anywhere.

Caraway (Carum Carui).—Sow thinly. Thin out to 9 inches apart. Used in confectionery.

Chervil (Chærophyllum sativum).—For cookery purposes, and in mixed salads. Sow and thin out. The plant does not last long, and fresh sowings must be made.

Chives (Allium Schænoprasum).—Propagated by division. A few should always be grown, as they are good for salads; lack the bitter taste of onions.

Clary (Salvia sclarea).—Not much used, but for some soups they are required. Sow in lines and thin out.

Coriander (Coriandrum sativum).—Largely used in soups, and the seeds in confectionery. Sow.

Fennel (Fœniculum vulgare).—Propagated by divisions or from seed. Used in fish sauces.

Garlic (Allium sativum).—Much liked by some people in soups, and for other purposes. The cloves or bulbils which are formed on the stems should be planted 6 inches apart, in drills 1 foot asunder. Likes a light, dry, rich soils.

Horehound (Marrubium vulgare).—I am often asked for this plant, and it seems to be a favourite for making medicinal drinks, and I believe it has been proved to be very valuable in cases of distressing cough.

Marjoram, Sweet (Origanum Majorana).—Much used for flavouring. Sow in light soil and thin out.

Mint (Mentha viridis).—Largely used in cookery. Often called spearmint. It is best propagated by division of the roots, and will grow in any fairly good garden soil.

Parsley (Petroselinum sativum).—No cook can get along without parsley. It is often sown around kitchen garden plots for edgings. It will give more satisfaction if sown in drills about 1 foot apart, covered with half-an-inch of good fine soil, and carefully watered. You should have enough to enable you to avoid picking the plants too closely. The curled varieties are the best; 2 oz. of seed will be enough.

Purslane (Portulaca aurea).—Golden purslane is the most esteemed. It may be sown in a box or bed, and planted out 1 foot apart.

Rosemary (Rosmarinus officinalis).—Found in every collection of herbs, but not used for culinary purposes. Once had a great reputation as a cure for baldness, and there can be no doubt that a decoction does largely promote the growth of the hair. It enters into the ingredients of Eau-de-Cologne. It can be propagated from cuttings or seeds, and may be planted out in little hedges 8 inches apart, in rows with, say, 2 feet between the rows.

Rue (Ruta graveolens).—Used in domestic medicine, but caution is advisable in its use. From seeds or cuttings. Plant out 2 feet apart.

Sage (Salvia officinalis).—Largely used in cookery, and should be always grown. From seeds or cuttings. Plant 2 feet apart.

Savory (Satureia hortensis and S. montana).—Raise from seeds, and plant out 1 foot apart.

Tansy (Tanacetum vulgare).—Propagated by divisions or from seed, which can be sown now.

Tarragon (Artemisia dracunculus).—Most housewives find uses for this perennial herb, and it should be grown by the amateur who aspires to a complete herb collection. Easily propagated by division. Likes rather dry, well-dug soil.

Thyme (Thymus vulgaris).—This old favourite is indispensable in a garden. It can be propagated by division, cuttings, or seeds. There is a lemon-scented variety which is capital for making the divisions in your herb border, as it makes a dwarf compact little hedge.

There are other herbs, like hyssop, lavender, marigold, wormwood, little used now. Instead of the heaps of herbs one sees at exhibitions, someone should try growing a collection in pots, plunging them in the ground until required for show. The pots known as 6-inch would suit; and if uniform in size, clean, and tastefully staged, and with the plants well grown and neatly stalked, this would form a most attractive and instructive exhibit.

To Dry Herbs.—Gather on a dry day as flowers are beginning to open. Carefully go over and remove dead leaves and any foreign matter. Tie in little bundles; hang in dark, dry place where draught can get at them. When quite dry, rub off leaves, sift and clean out all dust and twigs, &c. Then place leaves in wide-mouthed bottles, and seal airtight. Do not on any account subject to fire-heat or dry in sun. If treated as above, flavour will be preserved indefinitely.

Kohl-rabi.—This very fine vegetable does not seem to have attracted popular favour, perhaps because it must be eaten at its best to be properly appreciated. In some places it is cultivated as a field crop. The two best sorts for gardens are Early Purple Vienna and Early White Vienna. Sow as for cabbage. Plant out in rows 18 inches apart and 15 inches from plant to plant. The ground should be manured heavily.

LEEK.—This favourite vegetable should be sown in a seed bed, and when about 4 inches high the young plants should be planted out in trenches prepared as for celery, and earthed up in the same way. The larger the leek, the finer the flavour. They may also be planted out in rich ground, and slightly earthed up, and thus grown are useful for flavouring, but for exhibition it is possible to grow fine specimens in the first-mentioned way. Most growers shorten back the leaves a little when planting, and once or twice afterwards. I have, however, known first-prize leeks to be grown without this. Musselburgh and London Flag are good sorts. One ounce of seed will be enough.

LETTUCE.—The Cos or upright lettuce finds most favour on exhibition tables, at least in England. The head should be large and solid, fresh, tender, crisp; the leaves should have considerable substance, and when broken off the juice should exude freely. This salad requires to be sown frequently in this climate, where the growth is rapid—every three or four weeks. Sow in a seed bed thinly, and when fit to handle plant out into rows about 15 inches apart and 12 inches from plant to plant in the rows. You can also sow very thinly in rows, and thin out to about 12 inches apart, without transplanting. It requires a rich, fertile soil. When the plants are fairly well advanced, tie a soft piece of bast or other material around the leaves, so as to draw them together. This blanches the heart and greatly improves the salad. About 3 oz. may be reckoned a fair allowance for a garden of 1 acre. Lettuce in the seed bed should always be kept well watered and grown on without a check, and when planted out will be the better of occasional waterings with liquid manure. Good varieties are:—Neapolitan Cabbage, Iceberg, and Drumhead, of the Cabbage varieties; and of the Cos sorts, Paris White Cos and Paris Green Cos.

MUSTARD.—This useful salad may be grown like cress, frequent sowings being made.

ONION.—These require well-drained, rich, loamy land, thoroughly well and deeply worked. A good quantity of manure should be thoroughly worked in. A good dressing of a mixture of salt and soot may with great advantage be forked lightly into the land before planting. Sow in rich beds, and when a few inches high transplant into rows about 9 inches apart and 15 inches between the rows. Do not plant deeply so as to cover the bulb, which should form on the surface of the ground. You can also sow thinly in drills about 12 inches apart, and thin out to 8 inches between the plants. Dress the surface with salt and soot, and stir in with a hoe when rain is likely after your plants are large enough to thin. You can transplant the thinnings to other beds if you choose. Always in sowing onions make your seed beds firm and cover very thinly. When sowing in drills avoid the mistake of making the drills deep. You can sow at frequent intervals all the year to procure young onions for flavourings, soups, and salads. About 8 oz. of seed will set you up.

The varieties chiefly grown and stocked by colonial seedsmen are:—Brown Spanish, White Spanish, James Keeping, Giant Rocca, and Silver Skin (for pickling).

PARSNIPS.—This really splendid and nutritious vegetable one does not see nearly so much in use as could be wished. I remember as a lad scoring a huge success with some parsnips grown for exhibition at the International Exhibition held at Dublin some time in the early seventies. I forget where I received the idea, but I have never seen the method since, nor, for the matter of that, such good parsnips. A piece of moderately rich, extremely well and deeply trenched ground was chosen, and in this, at distances of about 18 inches apart, holes were driven down with an iron crowbar, which was worked about until the diameter of the hole at the top was about 9 or 10 inches, and the depth about 2 feet 6 inches. These holes were filled with an extremely rich, fine compost, made up as if for potting purposes, with rich loam, leaf mould (finely divided), thoroughly rotted manure, and bonemeal—in short, the most easily assimilated compost which could be thought of. This was rammed into the holes moderately firmly, and in the centre were sown three or four selected seed. When these were

well up, the strongest seedling was allowed to remain and let go ahead. This it did with such a will that, as stated, I have never seen such parsnips since. For ordinary growths it will be well to sow the seed in drills about 15 inches apart; sow thickly and thin out to 12 inches apart. You will require not more than 6 oz. of seed. Large Jersey is a good sort, and Hollow Crowned, which, I think, was the variety grown as above, is a sort which can be recommended.

Peas.—On the cultivation and varieties of these one might write a volume, and every grower has his pet varieties, and often has pet methods. As an exhibition vegetable, the pea comes in the first flight. The pod should be long and straight, of good girth, and of a clear healthy colour. All the pods in a dish should be as uniform in size, shape, and colour as possible. The peas should be dark-green, large, tender, and sweet. They should have a full plump appearance, and fill the pod well. Framers of exhibition schedules should always state the number of pods allowable in a dish of peas.

Peas like lime, and where this is deficient it should be added. The ground should be well manured. If heavily manured for the previous crop and in good heart, this will suffice. For the taller kinds the rows will have to be marked out wider apart than for the dwarf varieties. For small gardens the larger varieties may be grown a considerable distance apart, and other vegetables grown between. Four feet apart will do for the dwarfer sorts. Make a flat furrow 6 to 8 inches wide; scatter your seed evenly and not too thickly over this—an average of 1½ to 2 inches apart will do. Let the soil be then raked in, breaking any lumps with the rake. Peas like liquid manure, and on sewage farms I have seen grand crops raised. I give a few varieties and their heights:—Daniel O'Rourke, 3 feet; Tom Thumb, 1 foot; Beck's Prizetaker, 4 feet; Telephone, 4½ feet—this pea is about the best for exhibition; Yorkshire Hero, 2½ feet—a grand pea; Stratagem, very dwarf, also good for show purposes; McLean's Little Gem, 18 inches, a cottager's pea; American Wonder, 1 foot.

Potatoes.—Here again we have a subject upon which gardeners and farmers "agree to differ," and nearly every grower will give you different instructions. So much attention has been directed to the crop, and it has been grown under so many different circumstances of soil and climate, that it is small wonder that there is great divergence of opinion as regards its cultivation.

The potato likes well-tilled rich soil, and likes also a change of soil, not thriving so well two years in succession on the same land. Well-prepared manure, which has been turned in the manure heaps, should be well dug into the soil. There are several ways of planting, but for garden work perhaps the best is to plant the set in trenches made with the spade, from 2 feet to 2 feet 6 inches apart, and 9 to 12 inches from set to set. Whole sets are now preferred to cut sets. They should be strong tubers with plump eyes. The after cultivation will consist of hilling up with the Planet Junior or with a hoe, and keeping clear of weeds. Bear in mind that in the cultivation of the potato every loosening of the surface of the ground will pay. The soil cannot be kept too loose. It will be as well also to bear in mind in growing potatoes for exhibition that the best tubers are those tolerably near the surface, and therefore avoid covering them more than is necessary. A good article on the cultivation of the potato will be found in "The Farmers and Fruit Growers' Guide," issued by the Government of New South Wales in 1897, page 150. Varieties recommended are—Early Rose, Bliss's Triumph, Snowflake, Prolific Manhattan, and Peerless.

When you set up a collection of potatoes for exhibition, try to have the tubers as even in shape and appearance as possible. Do not on any account allow the skin to be broken, and, if you can, get some of the nice, green, flaky moss which can be found on fallen trees in the scrub to arrange your tubers on, keeping each variety to itself. The tubers should not be heaped on top of each other, but a certain number of each should be shown, each laid on the carpet of green moss separately.

Radish.—This agreeable salad can be raised in a bed 4 feet wide in any loose good soil. Sow thickly, thin out as they come on, and make other sowings to keep up a succession; 1½ oz. seed.

SALSIFY.—The roots are used. Must have a deep, fairly rich soil. Sow in rows 1 foot apart and thin out to 6 or 8 inches in the rows; ½ oz. of seed.

SPINACH.—Well-dug land, in which plenty of well-rotted manure has been dug in. Sow in drills about 18 inches apart, and thin out to 9 inches in the drills, using the young plants you take out. For all these drilling and hilling-up purposes you should have an Avery's garden plough with its attachments. It will save you much labour.

TURNIPS.—Sow the seed in drills in rich ground. When up, thin out to 6 inches apart, either with the hand or a small sharp hoe. Red Top American, White Dutch, and Early Snowball are varieties recommended. About 6 oz. will see you through for the year.

FLOWER GARDEN.—Now is the time to plant out bulbs. A complete garden could be furnished with these charming plants, which are to be had in every colour and variety. The following genera may be selected from, and amongst them will be found many hundreds of interesting species and varieties. I have not followed strict botanical nomenclature, giving popular names occasionally:—Allium, Alstrœmeria, Amaryllis, Anemone, Arum, Babiana, Brodiæ, Bulbocodium, Calochortus (Mariposa lilies), Camassia, Choinodoxa (Glory of the snow), Cliveia, Colchicum, Crinum, Crocus, Crown imperial, Eranthis, Eremurus, Erythronium (Dog's-tooth violets), Freesia, Fritillaria, Galanthus, Galtonia (Cape hyacinth), Gladiolus, Hæmanthus (Blood-flower), Hippeastrum, Hyacinthus, Hypoxis, Jonquils, Lachenalia, Leucojium, Iris, Ixia, Lilium, Muscaria, Narcissus, Nerine, Ornithogalum, Pancratium, Ranunculus, Richardia, Schizsostylus, Scilla, Sparaxis, Sprekelia (Jacobean lilies), Tigridia, Trillium, Tritelia, Tritonia, Tulipa, Watsonia. Of course there are other genera, and I will give you a chapter on bulbous plants when I get time.

All bulbs like well-drained, somewhat sandy soil, with a plentiful admixture of leaf mould. Manure should be well rotted and thoroughly incorporated with the soil. The leaves of gladioli will soon be withering, and these should be lifted when the leaves become quite withered, and replanted.

All annuals and herbaceous plants which it is intended to raise from seed should be sown this month. It is necessary in sowing small seeds and in other garden work, such as preparing lawns, that the surface of the ground should be made as fine as possible, and the rakes to be purchased in the shops are seldom suitable to this purpose, being as a rule much too coarse. This is the specification for a rake which I have made for this purpose, and which acts like a charm. Take a piece of light fine-grained wood (pine or cedar) 21 inches long, 1 inch wide, and ¾-inch thick. Get some wire ⅛-inch thick, and make twenty staples 2¼ inches long, cutting the points off square. Let the prongs of these staples be half-an-inch apart. Now bore a row of holes (forty) down the centre of the piece of wood on the widest side. Let these holes be half-an-inch apart, and of such a size that each two of them will take a staple. Now push or hammer in the staples, and the points will project through about 1½ inches, and you will have a rake-head with forty tines having a space between each two of three-eighths of an inch. Lay the head on a bench, and tap the tines with a hammer until they all have a slight equal curve towards the direction from which you will draw the rake. Take a strip of thin zinc or tin 2 inches wide, double it down over the back to keep the staples from lifting out, and tack it to the sides. Now you want a handle, and this is secured by a long screw to the middle of the head, and a piece of strong hoop-iron passed around the head and screwed to the handle above and below, two holes being made in the iron where it crosses the head for the two teeth to pass through. The materials for this tool may be found almost everywhere, and it beats any "store" rake. It may be made finer if desired, but this is fine enough for most purposes.

Cuttings.—Put in cuttings of shrubs and all herbaceous plants. Exchange with your neighbours for varieties which you may not have. This exchange brings out the neighbourly traits which it is said a love of gardening tends to

foster. We put in a great number of cuttings here, and we do it in this way: The ground is prepared and a line stretched, and the surface flattened down along the line with the back of a spade unless the ground is fairly stiff, in which case it is simply raked level. Then a trench 4 to 5 inches deep is cut with a spade, drawing the earth away from the line, the trench being in this shape—⌝. Then the cuttings are laid in against the upright side, a little fine sand scattered along their bases and the earth firmly rammed in with the back of a rake, and the line shifted to the next row, which is always far enough apart to allow the Planet Junior to run down along and make it warm for weeds. Rose cuttings may be put in after the same fashion, but should be somewhat deeper. See my directions in a previous number of this *Journal*.

A small close frame is a most useful adjunct to the garden. Out of such a frame, 3 feet by 12, which only cost a few shillings, many thousands of plants have come during the past few years here. It should be low and close, and furnished with some simple arrangement of roller-blinds.

Cannas.—You should endeavour to get as good a stock of these as you possibly can. We have had some grand ones in flower. The blooms were like orchids, in some cases 6 to 8 inches across, and of great substance. If you have any varieties which I have not got, I shall be glad to get some roots, and will reciprocate. This is my list, not so full as I could wish:—

Admiral Avellan, Admiral Courbet, Alphonse Bouvier, America Arthur de l'Aigle, Austria, Commandant Dubois, Comtesse de Bouchard, David Hoehnbreck, Ehmaunii, Ehmaunii Bruantii, Edouard Andre, F. Marmet, Fratelli Ingegnoti, Gladioliflora, Gloire de Lyon, Hybrid, Imperialis, Italia, Isaac Casati, Kaiser Wilhelm II., Koenigen Charlotte, La France, L. E. Bally, Lutea splendens, Madame Just, Madame Crozy, Miss Sarah Hill, Mrs. Cleveland, M. Sobeyrand, Parthenope, Paul Marquent, Perfection, Professor David, Progression, Queen Charlotte, Souv. de Asa Gray, Tiger, Victor Hugo, W. Pfitzer. In all, forty extremely good varieties.

Plenty of food must be given to Cannas, and waterings with liquid manure will assist them greatly.

Cuttings of carnations can be now put in; they require sandy soil.

Chrysanthemums require attention in the way of disbudding, staking, watering with liquid manure, &c. Growers for exhibition will thin out to a few buds, and take measures for protecting the flowers from rain and scorching sun, but inasmuch as every grower has his own methods, by which he swears, very little need be said on this subject. A much more beautiful object than a plant trimmed for the production of exhibition flowers is a well-foliaged, flower-covered plant loosely and naturally staked out.

Dahlias are now looking well. Those in these Gardens are, at date of writing (13th February, 1900), showing well, and they are just at that stage when a good deluging of liquid manure and a mulching of short manure would work wonders, but to know that they require this is one thing, to find the labour to do it is another. Dahlias make capital exhibition subjects, and they are well within the reach of all to grow, and easily transported and staged. It is a wonder that they are not more largely represented at Queensland flower shows. They are divided into show, fancy, bedding, and single dahlias, and the range of colours is very great. Single dahlias may be had from seeds, and a solid large bed of these will supply a great quantity of flowers of decorative value. Where there is a tendency to produce a large number of flowers it is as well to disbud to some extent; and the grower for exhibition always disbuds to secure fine blooms, and shades with specially prepared caps those which remain.

I am often asked to recommend climbers which may be planted now. A few which do well here are:—

Allamanda Schottii, beautiful yellow; Antigonon leptopus, a charming cerise-coloured climber; Aristolochia elegans, handsome as an orchid, easily grown, curious; Aristolochia ornithocephela (Dutchman's pipe), very curious, large, always attracts attention; Asparagus plumosa, grows in any shady place;

Asparagus racemosus, green, close growing, covers a fence in a shady place; Beaumontia grandiflora, splendid white flower, grand for a fence, will grow to 50 feet high; Bignonia capensis, good for a fence; Bignonia venusta, a lovely creeper, will cover the roof of an ugly shed better than anything; Bougainvillea glabra, B. spectabilis, and B. splendens, are magnificent climbers which soon clothe the ugliest fence with beauty; Buddleia madagascariensis, a large trailing plant good to plant over objectionable stumps, &c.; Clerodendron Thompsonii, rather delicate flowers, favourites for button-holes, &c.; Lonicera caprifolium does well here, good to cover wire netting; Mandevillea suaveolens, white, delicate; Quisqualis indica, a fine creeper, pink changing to white; Thunbergia fragrans, T. laurifolia, beautiful creepers, the latter very rank growing; Wistaria sinensis, a well-known favourite; there are hundreds of others, but you should have the above.

The mean shade temperature for March is 73 degrees, 3 degrees below the maximum mean and 15 degrees above the minimum mean.

The mean rainfall for thirty-eight years has been 6·56 inches.

The total rainfall in 1898 was 13·87 inches, and in March, 1870, as much as 34·04 inches fell.

The temperature is cooling off. Next month the mean will be 70 degrees; last month it was 75 degrees.

Public Announcements.

The Editor will be glad to receive any papers of special merit which may be read at meetings of Agricultural and Pastoral Associations in Queensland, reserving, however, the right to decide whether their value and importance will justify their publication.

The *Queensland Agricultural Journal* will be supplied to all members of Agricultural and Horticultural Societies who do not derive their livelihood solely from the land, on payment, in advance, of an annual subscription of 5s.

LIST OF AGRICULTURAL, HORTICULTURAL, AND PASTORAL SOCIETIES AND ASSOCIATIONS IN QUEENSLAND.

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Allora ...	Central Downs Agricultural and Horticultural Association	J. H. Buxton... ...	7 Feb.
Avondale ...	Avondale Farmers' and Planters' Association	N. J. Mikkelsen ...	
Ayr	Lower Burdekin Farmers' Association ...	Winsor H. Wilmington	
Beaudesert ...	Logan and Albert Pastoral and Agricultural Society	M. Hinchcliffe ...	11 May
Beenleigh ...	Agricultural and Pastoral Society of Southern Queensland	Wilson Holliday ...	14 April
Biggenden ...	Biggenden Agricultural and Pastoral Society	Charles H. Peppin ...	14 June
Biggenden ...	Biggenden Farmers' Association	Charles H. Peppin ...	
Birthamba ...	South Kolan Agricultural and General Progress Association	G. W. Nixon ...	
Blackall ...	Barcoo Pastoral Society	F. Clewett	
Boonah ...	Fassifern and Dugandan Agricultural and Pastoral Association	J. A. McBean ...	18 and 19 May
Bowen ...	Pastoral, Agricultural, and Mining Society ...	J. E. Smith	17 Aug.
Bowen ...	Preston Farmers' Association, Lower Proserpine	G. Archer	
Bowen ...	Proserpine Farmers' and Settlers' Association	G. W. Pott	
Booyal ...	Booyal Farmers' Progress Association ...	Thos. Skillington ...	
Brisbane ...	Horticultural Society of Queensland	J. F. Bailey	26 and 27 April
Brisbane ...	Moreton Agricultural, Horticultural, and Industrial Association	J. Duffield	
Brisbane ...	Queensland Acclimatisation Society	E. Grimley	
Brisbane ...	Queensland Fruit and Economic Plant Growers' Association	G. K. Seabrook ...	
Brisbane ...	National Agricultural and Industrial Association of Queensland	H. C. Wood	10, 11, and 12 Aug.
Brisbane ...	Queensland Stockbreeders' and Graziers' Association	F. A. Blackman ...	
Brisbane ...	United Pastoralists' Association	Fredk. Ranson ...	
Bundaberg ...	Bundaberg Horticultural and Industrial Society	H. E. Ashley... ...	
Bundaberg ...	Council of Agriculture	S. A. Lindeman ...	
Bundaberg ...	Woongarra Canegrowers' and Farmers' Association	W. H. Dart	
Burpengary...	Burpengary Farmers' Association	C. H. Ham	
Byrnestown...	Byrnestown Farmers' Progress Association ...	J. Dufficy	
Caboolture ...	Caboolture Farmers' Association	G. Mallet	
Cairns ...	Aloombah Farmers' Association	Chas. R. Spencer ...	
Cairns ...	Cairns Agricultural, Pastoral, and Mining Association	A. J. Draper... ...	28 and 29 Sept.
Cairns ...	Cairns District Coffee Growers' Association...	W. A. Hannam ...	
Cairns ...	Cairns District United Farmers' Association	Wm. Griffin ...	
Charleville ..	Hambledon Planters' Association	E. Whitehouse ...	
	Central Warrego Pastoral and Agricultural Association	E. F. C. Manning ...	25 and 26 May

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Charters Towers	Towers Pastoral, Agricultural, and Mining Association	W. Tilley	30 and 31 May; 1 June
Childers ...	Isis Agricultural Association	H. Epps	
Childers ...	Childers Progress Branch, Isis Agricultural Association	N. Rosenlund ...	
Childers ...	Doolbi Mill Branch, Isis Agricultural Association	W. T. H. Job ...	
Childers ...	Childers Mill Branch, Isis Agricultural Association	H. Epps	
Clermont ...	Peak Downs Pastoral, Horticultural, and Agricultural Society	F. Leysley	
Clermont ...	Peak Downs Dairymen and Settlers' Association	A. G. Pursell ...	
Cooktown ..	Cook District Pastoral and Agricultural Society	W. R. Humphreys ...	
Cooran ...	Cooran Progress and Agricultural Association	Thos. Smith	
Cordalba ...	Cordalba Farmers' Association	B. Goodliffe	
Currajong ...	Currajong Farmers' Progress Association ...	Wm. Howard ...	
Cunnamulla	South Warrego Pastoral Association	J. Winward	
Deception Bay	Deception Bay Farmers' Association	B. J. T. Liscombe ...	
Degilbo ...	Degilbo District Farmers' Association ...	J. Harvey	21 and 22 June
Gayndah ...	Gayndah Agricultural and Horticultural Association	J. C. Kerr	
Gin Gin ...	Pastoral and Agricultural Society of Gin Gin	E. K. Wollen ...	
Gladstone ...	Gladstone Pastoral and Agricultural Association	W. J. Manning ...	
Gooburrum, Bundaberg	Gooburrum Farmers' and Canegrowers' Association	W. J. Tutin	
Goondiwindi	MacIntyre River Pastoral and Agricultural Society	A. Gough	
Gympie ...	Agricultural, Mining, and Pastoral Society	F. Vaughan	13 and 14 Sept.
Gympie ...	Chatsworth Farmers' Progress Association ...	William Bellman ...	
Gympie ...	Deep Creek Farmers' Progress Association ...	W. Reid	
Gympie ...	Gympie Horticultural Society	Charles Brasch ...	19 and 20 April
Gympie ...	The Pie and Eel Creek Farmers' Association	D. J. O'Farrell ...	
Gympie ...	Gympie Central Farmers' and Progress Association	J. Howard Maynard	
Haslemore, Victoria, Herbert Riv.	Herbert River Farmers' League	Alfred Henry ...	
Helidon ...	Helidon Scrub Farmers' Progress Association	M. Morgan	
Herbert River	Halifax Planters' Club	H. G. Faithful ...	
Herbert River	Macnade Farmers' Association...	E. C. Biggs	
Herbert River	Ripple Creek Farmers' Association	J. W. Grimes ...	
Herberton ...	Mining, Pastoral, and Agricultural Association	John M. Hollway ...	3 and 4 April
Hodgson ...	Hodgson Farmers' Association	C.W. Nimmo ...	
Hughenden...	Hughenden Pastoral and Agricultural Association	H. P. Blackall ...	7 and 8 May
Ingham ...	Herbert River Farmers' Association	...	
Ingham ...	Herbert River Pastoral and Agricultural Association	P. J. Cochrane ...	15 and 16 Aug.
Ipswich ...	Ipswich and West Moreton Agricultural and Horticultural Society	P. W. Cameron ...	21 Sept.
Ipswich ...	Queensland Pastoral and Agricultural Society	Elias Harding ...	1 and 2 June
Kandanga (near Gympie)	Kandanga Farmers' Association	N. Rasmussen ...	
Kolan ...	Kolan Canegrowers' and Farmers' Association	C. Marks	
Ladeside ...	Mungore Farmers' Association...	J. M. Robinson ...	
Laidley ...	Lockyer Agricultural and Industrial Society	John Fielding ...	25 and 26 July
Loganholme...	Logan Farming and Industrial Association ...	F. W. Peek	
Longreach ...	Longreach Pastoral and Agricultural Society	J. P. Peterson ...	12 April
Lucinda Point	Victoria Farmers' Association	W. S. C. Warren ...	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Mackay ...	Agricultural, Pastoral, and Mining Association	F. Black	
Mackay ...	Pioneer River Farmers' Association	E. Swayne	28 and 29 June
Mapleton, *vid* Nambour	Mapleton and Dulong Fruitgrowers' and Farmers' Progress Association	W. J. Smith	
Maryborough	Maryborough Horticultural Society	H. A. Jones	
Maryborough	The Island Farmers' Progress Association ...	C. A. Schmidt ...	
Maryborough	Wide Bay and Burnett Pastoral and Agricultural Society	G. Willey	4, 5, and 6 July
Miallo	Miallo Progress Association	E. F. Welchman ...	
Milbong ...	Milbong Farmers' Association	T. R. Garrick ...	
Mitchell ...	Mitchell and Maranoa Pastoral, Agricultural, and Vinegrowers' Association	H. J. Corbett ...	
Mosman River	Mosman River Farmers' Association	Geo. W. Muntz ...	
Mount Mee...	Mount Mee Farmers' Association	R. Thomas	
Mount Morgan	Mount Morgan Mining, Agricultural, Poultry, Pastoral, and Horticultural Society	G. Orford	
Mount Morgan	Mount Morgan Agricultural, Pastoral, and Poultry Society	Thos. W. Walker ...	
Mundoo ...	Johnstone River Farmers' Association ...	J. McInnes	
Nerang ...	South Queensland and Border Pastoral and Agricultural Society	W. J. Browne ...	8 Sept.
North Isis ...	North Isis Canegrowers' Association	W. J. Young ...	
Pialba	Pialba Farmers' Association	J. B. Stephens ...	
Pickenjennie ...	Wallumbilla Selectors' League	George Dalziel ...	
Pickenjennie	Pickenjennie Branch, Wallumbilla Selectors' League	George Dalziel ...	
Pinbarren ...	Pinbarren Agricultural and Progress Association	H. Armitage, senr. ...	
Port Douglas	Pastoral, Agricultural, and Mining Association	W. H. Dorrat ...	
Razorback ...	The Razorback Fruitgrowers' Association ...	Robert Tinning ...	
Rockhampton	Central Queensland Farmers' and Selectors' Association	T. Whitely, Coowonga	
Rockhampton	Central Queensland Pastoral Employers Association	G. Mackay	
Rockhampton	Central Queensland Stockowners' Association	R. R. Dawbarn ...	
Rockhampton	Rockhampton Agricultural Society	R. R. Dawbarn ...	10 and 11 May
Roma ...	Western Queensland Pastoral and Agricultural Association	Angus McPherson ...	25 and 26 July
Roma	Yingerbay Farmers' Association	Alex. C. McIntyre ...	
Rosewood ...	Farmers' Club	P. H. Adams... ...	25 Aug.
Southport ...	Southport Horticultural Society	E. Fass	19 April
Springsure ...	Queensland Pastoral Society	G. R. Milliken ...	
Stanthorpe ...	Border Pastoral, Agricultural, and Mining Society	Geo. Simcocks ...	22 and 23 Feb.
Stanthorpe ...	Stanthorpe Horticultural and Viticultural Society	R. Hoggan	
Stanwell	The Stanwell Agricultural Society	A. Spanner	24 May
St. George ...	Balonne Pastoral and Agricultural Association	T. M. Cummings ...	
Tinana	Tinana Fruitgrowers' and Farmers' Association	Chas. Parke	
Toowoomba...	Darling Downs Horticultural Association ...	H. Hopkins	
Toowoomba...	Drayton and Toowoomba Agricultural and Horticultural Society	H. Symes	
Toowoomba...	Royal Agricultural Society of Queensland ...	F. Burtt	1, 2, and 3 Aug.
Townsville ...	Townsville Pastoral, Agricultural, and Industrial Association (formerly North Queensland Pastoral and Agricultural Association)	J. N. Parkes	6 and 7 June
Wallumbilla	Wallumbilla Selectors' League	George Dalziel ..	
Warwick ...	Eastern Downs Horticultural and Agricultural Association	J. Selke	31 Jan. & 1 Feb.
Wellington Point	Wellington Point Agricultural, Horticultural, and Industrial Association	F. W. Wort	13 June
Woombye ...	Woombye Fruitgrowers' Association	P. S. Hungerford ...	
Woowoonga	Woowoonga Scrub Farmers' Association ...	H. B. Griffiths ...	
Zillmere ...	Zillmere Horticultural Society	C. McF. Fischer ...	20 Jan.

"THE DISEASES IN PLANTS ACT OF 1896."

Department of Agriculture,
Brisbane, 19th January, 1899.

HIS Excellency the Governor, with the advice of the Executive Council, and in pursuance of the provisions of "*The Diseases in Plants Act of* 1896," has been pleased to make the following further Regulations.

J. V. CHATAWAY.

THE FUMIGATION OF FRUIT FOR EXPORT.

1. Any one who wishes to erect a chamber or building for the fumigating of fruit is requested to give notice to the Under Secretary for Agriculture, who will take steps to see that the chamber or building is properly constructed.

2. When it is required to fumigate fruit for export, twenty-four hours' notice must be given to the said Under Secretary or such other officer as may be duly authorised to accept such notice.

3. The operation of fumigating must be conducted under the control of an officer authorised by the Minister for Agriculture.

4. The fumigating chamber may be made of any convenient size or material, the essential point being that it shall be capable of being closed absolutely airtight, and provided with a flue-pipe in the roof which can be opened or closed to allow of the escape of the gas after fumigation. The flue must be provided with a box or chamber to contain caustic soda or potash to destroy the gas.

The fumigating chamber must be provided with a shutter or sliding panel in the lower portion of the door or wall.

Door, flue, and shutter must all be made to close absolutely airtight.

DIRECTIONS FOR FUMIGATING WITH HYDROCYANIC ACID GAS.

Proportions of Ingredients.—For every 150 cubic feet of room take 1 ounce of cyanide of potassium, 5 fluid ounces sulphuric acid, 10 fluid ounces water.

Having placed the fruit to be fumigated in the chamber, see that the flue and the shutter in the door or lower part of all are properly closed.

The acid is then to be diluted in the following manner:—The whole of the water is placed in a shallow china or glazed earthenware vessel, such as an ordinary wash-hand basin. (Metal vessels are inadvisable unless they are leaden ones.) The sulphuric acid is next poured on to the water in a thin stream, stirring the while with a stick. Do not mix by adding the water to the acid.

The basin containing the acid thus diluted (which should be allowed to cool) is now placed in the fumigating chamber, and the cyanide of potassium is emptied into it.

The gas is given off with great violence, and the door should be immediately closed.

The whole is now to be left to itself for one hour. At the end of this time the shutters in the flue and in the door are opened, and the draught produced drives the gas out of the chamber. At the end of half an hour the door is thrown open, and if the draught has been effective there should be hardly any trace of hydrocyanic gas recognisable. The chamber may be left in this condition for another ten minutes or a quarter of an hour. The fruit is now to be moved and allowed to remain in a well ventilated place, preferably out of doors, for another half an hour. Samples of fruit will be examined from time to time by the entomologist.

Caution.—As hydrocyanic acid gas is most deadly in its effects on animal life, the greatest care must be taken in its use.

Department of Agriculture,
Brisbane, , 18 .

This is to certify that has treated cases of citrus fruit with hydrocyanic acid gas for one hour, under my supervision. These cases have been branded "Crown" over "Passed."

Shipping marks:
Per S.S.:
Consigned to:

Department of Agriculture,
Brisbane, 26th January, 1899.

THE following Proclamation by His Excellency the Governor of New South Wales is published for general information.

J. V. CHATAWAY.

NEW SOUTH WALES, to wit.
(L.S.)
HAMPDEN, *Governor.*

PROCLAMATION.

By His Excellency The Right Honourable HENRY ROBERT, VISCOUNT HAMPDEN, Governor and Commander-in-Chief of the Colony of New South Wales and its Dependencies.

WHEREAS the Governor is empowered by Section 9 of the "Vegetation Diseases Act, 1897," from time to time, by Proclamation in the *Gazette*, to declare any fungus or vegetable parasite whatever to be a fungus within the meaning of the said Act: Now, therefore, I, HENRY ROBERT, VISCOUNT HAMPDEN, the Governor aforesaid, with the advice of the Executive Council, do, by this my Proclamation, declare Black Spot (*Fusicladium*) to be a fungus within the meaning of the said Act.

Given under my Hand and Seal, at Government House, Sydney, this twenty-second day of December, in the year of our Lord one thousand eight hundred and ninety-eight, and in the sixty-second year of Her Majesty's reign.

By His Excellency's Command,

JOSEPH COOK.

GOD SAVE THE QUEEN!

Department of Agriculture,
Brisbane, 25th May, 1899.

HIS Excellency the Governor, with the advice of the Executive Council, has, in pursuance of the provisions of "*The Slaughtering Act of* 1898," been pleased to make the following Regulations.

J. V. CHATAWAY.

REGULATIONS UNDER "THE SLAUGHTERING ACT OF 1898."

Definitions.

1. Save as herein otherwise provided, in these Regulations the terms used have the meanings respectively assigned to them by "*The Slaughtering Act of* 1898."

The term "Stock" means and includes cattle, sheep, and swine;

The term "Licensing Court" means a Police Magistrate or if he is absent or there is no Police Magistrate, then any two justices sitting in a Court of Petty Sessions having jurisdiction in the district within which a slaughter-house is or is proposed to be established;

The term "Inspector" means the inspector (if any) to whom a district is assigned, or if he is absent, or there is no such inspector then any inspector appointed under the provisions of "*The Slaughtering Act of* 1898";

The term "Owner of stock" means the owner whether jointly or severally of the stock, or the authorised agent or superintendent of the owner, or the drover or person in charge of the stock.

Unlicensed slaughter-house.

2. Any person who establishes or keeps an unlicensed slaughter-house is guilty of an offence against these Regulations.

Illegal slaughter.

3. No person shall slaughter at any place other than at a licensed slaughter-house any stock the flesh of which is intended to be used for meat.

Licensing Court.

4. Subject to these Regulations, the Licensing Court may license slaughter-houses established or proposed to be established within a district.

Application.

5. Every person who desires to obtain a license or the renewal of a license for a slaughter-house shall make an application therefor in writing in the form in the First Schedule hereto or to the like effect.

Time for applying.

6. Every application shall be addressed to the Licensing Court of the district within which the slaughter-house is or is proposed to be established, shall be lodged with the proper Clerk of Petty Sessions, and shall be accompanied by the license fee hereinafter prescribed. Applications for licenses shall be so lodged on or before the fourteenth day of December, March, June, and September in each year. Applications for the renewal of licenses shall be so lodged on or before the fourteenth day of December in each year.

Duty of clerk of petty sessions.

7. Upon the receipt of every such application, the clerk of petty sessions shall forthwith forward a copy of the same to the local authority of the district and also to the inspector.

Representatives of local authority.

8. The local authority of the district may make to the Licensing Court such representations, in writing or otherwise, with respect to every such application, as the local authority thinks fit.

Report of inspector.

9. It shall be the duty of the inspector, upon the receipt of every such copy of an application, to inspect the premises in respect of which a license or the renewal of a license is applied for, and to report thereon to the Licensing Court. He shall either make such report in writing under his hand, or, if directed so to do by the chief inspector, shall personally attend at the sittings of the Licensing Court, and there orally report to the Court upon the same.

The hearing.

10. The Licensing Court shall sit for the hearing and determination of all applications for licenses on the first Tuesday in the months of January, April, July, and October in every year.

The Licensing Court shall sit for the hearing and determination of all applications for the renewal of licenses on the first Tuesday in the month of January in every year.

After considering the report of the inspector and the representations, if any, of the local authority of the district, the Court may, subject to these Regulations—

(1) Grant the application; or
(2) Adjourn the application for the purpose of the execution by the applicant of such works as in the opinion of the Licensing Court are necessary to render the premises suitable and proper for the slaughter of stock; or
(3) Refuse the application.

Duration of license.

11. Save as hereinafter provided, a license for a slaughter-house shall remain in force for the period of one year, but may from time to time be renewed for a like period. Provided that a new license granted for a slaughter-house shall only remain in force until the sitting of the Licensing Court held in the month of January following the date on which such license was granted. Provided further that all existing licenses shall remain in force until the sitting of the Licensing Court held in the month of January next.

Fees for licenses.

12. The annual fee payable in respect of the license or the renewal of the license of a slaughter-house shall be twenty shillings.

Fees for defraying expenses.

13. The fees payable by the licensee of a slaughter-house for the purpose of defraying the expenses of inspection shall be as follows, that is to say:—

	s.	d.
For every bullock, steer, cow, or heifer slaughtered ...	0	3
For every 12 sheep or calves slaughtered	0	3
For every head of swine slaughtered	0	3

Such fees shall be paid by the licensee to the inspector monthly, or at such shorter intervals as the inspector may require.

Receipt.

14. The inspector shall, upon the payment of such fees, give to the licensee a receipt under his hand in the form of the Second Schedule hereto.

Delivery note.

15. When stock are delivered at a slaughter-house to be slaughtered, the owner of the stock shall deliver to the owner of the slaughter-house a way bill or delivery note of the stock, setting forth the number, the description, and the brands or marks of the stock, and signed by the owner thereof.

The owner of the slaughter-house shall retain and preserve every such way bill or delivery note, and shall, on demand, produce the same to the inspector.

Slaughtering book.

16. The licensee of every slaughter-house shall keep a book called a "Slaughtering Book," in which shall be correctly recorded all the particulars set out in the Third Schedule hereto; and such book shall be open at all reasonable times to the inspection of any inspector, or any inspector of brands or police officer, who may make any copy of or extract therefrom.

Floors.

17. The floor of every place in a slaughter-house where stock are pithed or slaughtered, or where meat is dressed, prepared, treated, or stored, shall, if required by the inspector, be constructed of concrete or otherwise rendered impervious, to his satisfaction.

Drainage; ventilation.

18. Every slaughter-house shall be drained and ventilated to the satisfaction of the Inspector.

Blood.

19. In every slaughter-house all blood shall be boiled, desiccated, or otherwise treated to the satisfaction of the Inspector.

Privies.

20. Every water-closet, privy, cesspool, and urinal used in connection with a slaughter-house shall be situated at a distance of not less than one hundred yards from any building, enclosure, or place in or at which stock are slaughtered or meat is dressed, prepared, treated, or stored.

Pigsties.

21. Every pigsty, enclosure, and place where swine are kept at a slaughter-house shall be situated at a distance of not less than two hundred and fifty yards from any building, enclosure, or place in or at which stock are slaughtered or meat is dressed, prepared, treated, or stored.

Offal to swine.

22. Swine shall not be fed with offal at a slaughter-house, nor shall any offal be removed therefrom for the purpose of feeding swine, unless such offal has first been thoroughly cooked.

Notice of slaughtering.

23. The owner of every slaughter-house shall give to the inspector such notice of his intention to slaughter stock as will enable the inspector to inspect such stock.

Tampering with meat.

24. Until stock slaughtered have been inspected by the inspector the pleuræ are not to be stripped or otherwise interfered with, and no part of the carcass is to be cut away, manipulated, or interfered with in any manner which may prevent the discovery of disease or may alter the true condition of the meat.

The inspector may condemn any stock or meat which in his opinion has been dealt with in contravention of the provisions of this Regulation.

Branding meat.

25. When the inspector has inspected any meat and approved of the same, he shall brand each separate quarter of beef and each carcass or quarter of mutton with a mark or stamp.

Any person who wilfully removes or obliterates any such mark or stamp, or who, not being an inspector, affixes or causes to be affixed to any meat any such mark or stamp, is guilty of an offence against these Regulations.

Calves.

26. Calves less than four weeks old are not to be slaughtered for meat.

Condemned meat.

27. Condemned meat at a slaughter-house shall be rendered unfit for the food of man in the mode directed by the inspector.

Removal of hides, &c.

28. Offal and the hides, skins, heads, and feet of stock slaughtered at a slaughter-house shall only be removed from the premises in the manner and at the times directed by the inspector.

The contents of paunches and of intestines shall be deposited in the place appointed by the inspector for the purpose.

Carriage of meat.

29. Meat shall be carried from the slaughter-house to the butcher's shop in vehicles approved by the inspector.

Every such vehicle shall be provided with a proper roof, and shall be so constructed as to permit of a free current of air.

Meat shall be carried in such vehicle either suspended from the roof or sides thereof, or so arranged that a free current of air may circulate between the carcasses or portions of carcasses being carried.

Blowing meat, &c.

30. No person shall blow with his breath or otherwise into any meat, or eject any salt, liquid matter, or other substance from his mouth thereon.

No person shall treat, dress, or prepare any meat by means of any preservative or other substance which, in the opinion of the inspector, injures, or is likely to injure, such meat or to render it unfit for the food of man.

Offences.

31. Any person who contravenes any of the provisions of these Regulations is guilty of an offence, and is liable to a penalty not exceeding fifty pounds.

When a licensee of a slaughter-house, having been convicted of an offence against "*The Slaughtering Act of* 1898" or these Regulations, is on a second or subsequent occasion convicted of an offence against such Act or Regulations, the Court, by or before whom he is so convicted as last aforesaid, may, in addition to the punishment for such offence, order the license of the slaughter-house to be suspended for such time as the Court thinks fit, or to be absolutely cancelled, and such license shall be so suspended or cancelled accordingly.

FIRST SCHEDULE.

APPLICATION FOR A LICENSE OR THE RENEWAL OF A LICENSE OF A SLAUGHTER-HOUSE.

"*The Slaughtering Act of* 1898."

To the Licensing Court for the District of [*name of District*].

I [*or* we] hereby apply to the Licensing Court to be holden for the district of [*name of district*] for a license [*or* the renewal of a license] of a slaughter-house proposed to be established [*or* established] at [*describe locality so as to clearly identify it*].

Dated at the day of

Applicant.

SECOND SCHEDULE.

RECEIPT.

"*The Slaughtering Act of* 1898."

I have this day received from [*name of licensee or licensees*] the sum of £ , being fees in respect of stock slaughtered at the slaughter-house at [*situation of slaughter-house*], whereof he is the licensee [*or* they are the licensees], between the day of and the day of .

The particulars of the stock are as follow:—

Cattle [*insert number*]
Sheep and Calves [*insert number*]
Swine [*insert number*]

Dated at the day of

Inspector.

THIRD SCHEDULE.

SLAUGHTERING BOOK.

Date of Slaughtering.	Number of Stock Slaughtered.			Person from whom Stock obtained.	Brands or Marks.
	Cattle.	Sheep.	Swine.		

REGULATIONS UNDER "THE SLAUGHTERING ACT OF 1898."

Department of Agriculture,
Brisbane, 15th November, 1899.

HIS Excellency the Lieutenant-Governor, with the advice of the Executive Council, has, in pursuance of the provisions of "*The Slaughtering Act of* 1898," been pleased to make the following additional Regulation.

J. V. CHATAWAY.

32. Clause 12 of the Regulations under "*The Slaughtering Act of* 1898," dated the twenty-fifth day of May, 1899, and published in the *Government Gazette* dated the twenty-seventh day of May, 1899, is amended by the addition of the following paragraph:—

Provided that the annual fee payable in respect of such license or renewal of such license issued to persons who only slaughter calves and pigs, but not exceeding five head in all in any week, shall be two shillings and sixpence

By Authority: EDMUND GREGORY, Government Printer, William street, Brisbane.

Agriculture.

ABOUT HAIL AND HAILSTORMS.

By HENRY A. TARDENT,
Manager, Biggenden Experiment Farm

In a recent number of the *Journal* (December, 1899) I had summed up the present state of our knowledge of frost and prevention from its damage. Judging by the numerous letters I have received on the subject from various parts of the colony, many of our best farmers have taken it to heart, and are well resolved to dispute in the future their crops to the injuries from Jack Frost. To-day I would like to write about another meteorological calamity which not seldom visits the farmer in the shape of *hailstorms*.

True, hailstorms are usually of only limited areas. They seldom acquire the extent of a national calamity like a flood or a drought, for instance. To the individual farmer, however, they are most destructive, merciless, and ruinous. A hail-devastated farm is one of the saddest sights on earth. Not only does the hail destroy the crops of the year usually at the time when they are most promising or nearing maturity, but it inflicts serious and lasting injuries to woody plants such as grape vines, fruit trees, &c., thus often compromising the crops of subsequent years. In one place or another visitations from hailstorms are, so to say, of yearly occurrence, and the total loss thus sustained by our colony must be very important indeed, although I do not think that there are any statistics available yet on the subject. In other countries the calamity is especially dreaded by the vinegrower. In Italy alone the damage to the vineyards is officially estimated at over 100,000,000 francs (£4,000,000) per annum! It is probably much superior in France and Spain.

Of course, ever since man started to think, he has tried to combat and overcome those forces of Nature which were inimical to his work and activity. For thousands of years, however, he shrunk back paralysed with fear and powerless in the presence of such awful forces as lightning and hailstorms. Although he could not help remarking that they fell indiscriminately on the righteous and on the sinners, he accepted them submissively as an uncontrollable decree of the irresponsible gods.

The true scientific mind does not know such feelings.

The more he progresses the more it appears to him that the Great Master does not rule this universe by whims and rules of thumb, but by established and immutable laws. To discover those laws and arrange our lives in accordance with them has God given to man a soul and a mind with the noble faculty of thinking. Once awakened, the scientific spirit never stops. One day he captures the wind and makes it to work for him. Another day he discovers the extraordinary force of expansion of water transformed into steam, and the whole social life and human industry are transformed. The instantaneous transformation of a compound of solid bodies into gas gives him gunpowder that is the means of killing at a distance his enemies, thus minimising his chances of death, &c. But to Franklin, to the great Franklin and his followers, it was given to capture lightning, to tame it, to produce it at will, to direct it to fall where they please, to domesticate it and reduce it to the rôle of message-carrier, motive power draught horse, fuel and lighting material, &c.

What a victory on the most dreadful force known to man!

The question is now, Shall we ever obtain a similar control over storms, and especially hailstorms? Shall we ever be able to render them innocuous and to defend our crops against their ravages?

At first Franklin's discovery of the lightning-conductor had given great hopes that it would help in subduing hailstorms too. It was surmised that the

formation of hailstones within clouds was due mainly to the action of electricity. It was inferred that if lightning-conductors were erected from distance to distance in the fields they would attract the electricity from the clouds and thus check the formation of hailstones.

Unfortunately, the results did not bear out those anticipations.

The question, however, is not yet considered incapable of solution, at least judging from a few articles which have appeared in the *Gazette de Lausanne*, and give a most interesting account of a Congress of Vinegrowers held recently at Casale Monferrato (Italy), with the object of studying hail and hailstorms. It is probably the first congress of its kind, and comprised accredited delegates from nearly all the vinegrowing countries of Europe.

It appears that as far back as 1880 an Italian savant, Professor Bombicci, of Bologna, had formulated the theory, founded on numerous observations, that showers of rain were most frequent in those places where gun practice shook the air and filled it with smoke. He concluded from it that it was possible to act artificially on the clouds and cause, so to say, the preventive abortion of those which are loaded with hail.

Leaving aside the well-known unsuccessful American experiments which had in view the artificial production of rain in a cloudless sky, we may safely say that Professor Bombicci's inferences were made use of for the first time in 1896 in Styria (Austria), where a progressive vinegrower, Burgomister Stieger, started shooting with cannons against the approaching storm clouds. This is how he went about it. He first established shooting stations on the hills surrounding his vineyards at an altitude of from 300 to 800 yards. At every station he had from five to six mortars in a wooden hut, so that shooting could be proceeded with even during rain. His mortars weigh about 160 lb. each, with a 3-centimeter chamber. They are 18 inches long. He loads them with about 5 oz. of miner's powder. As soon as suspicious clouds appear, he starts shooting towards them, and, behold! under the action of the sound waves, the clouds either disappear or come down in the form of heavy downfalls of rain. It is contended that Mr. Stieger's vineyards, which had up to then been regularly devasted by hail, became suddenly immune against it. This example was soon followed by his neighbours, and now the province of Styria has fifty-nine hail-preventing gun stations covering an area of 110 square kilometers.

An Italian who had visited those installations was so much struck by their results that he introduced on his return the system in Italy, and now there are in Northern Italy alone 950 of those hail-preventing stations.

All the speakers at the Congress bore testimony to the wonderful results obtained by means of that gun-and-mortar shooting. In the Italian province of Bergasno, the protected area suffered only to the extent of 7 per cent., whilst in the surrounding unprotected area the damage reached 80 per cent. of the total crops.

The following conclusions and recommendations have been unanimously adopted by the Congress :—

1. The stations shall be so established as to form a first gun line on the side where the storms usually come from. Other parallel lines shall be established behind the first one at a distance of about two kilometers (1¼ miles) from each other.
2. On the lines themselves the guns should be about one kilometer (1,093 yards) apart.
3. For every group of stations one of them should be appointed to give the signal of firing.
4. When signalled, the other stations shall start firing too, although it might appear to them unnecessary to do so.
5. The firing should begin when the storm clouds are about at the zenith (overhead).

6. The fire should be as much as possible at the rate of about three shots per minute until the rain begins to fall.
7. The fire should continue at the rate of at least two shots per minute as long as it rains heavily.
8. A severe watch should be exercised to see whether another storm is not in process of formation, in which case the fire shall be resumed with increased vigour.
9. When the rain slacks considerably, it is advisable to gradually cease firing.

It would, of course, be impossible in this short article to go into all the numerous details which have been touched upon at the Congress. It has been mentioned, however, that isolated shooting is of but little use. Therefore, many speakers advocated the establishment of stations being made compulsory. According to the estimates discussed at the Congress, the cost of establishment would come to about 1s. per acre, and the cost of yearly maintenance to a little over 3d. per acre.

Professor Marangona treated the scientific part of the subject. He explained that the gun or mortar shots produce a kind of rent in the clouds which causes the hailstones to transform themselves into raindrops or, at least, harmless snowflakes.

According to another theory, hail would be caused by raindrops passing through a cloud possessed of a temperature lower than freezing point. There they are supposed to coagulate and solidify to form the well-known hailstone. It is surmised that this cold cloud must be perfectly stationary (immobile) in order to obtain the formation of hailstones. Should it be put into motion or shaken by the sound waves, the hail phenomenon ceases to obtain. . . . .

Those explanations do not seem very clear, and must, I believe, be accepted as mere conjectures only until such a time as we shall be able to produce hail experimentally.

As to the practical results, they seem to have really commended themselves to the unanimity of the Congress of delegates, who warmly applauded the following concluding words of Professor Bombicci, the President of the Congress:—

"*Spariamo e speramo! l'avvenire dirà il resto!*" which, put into plain English, may be explained thus:—

"Let us then shoot, and hope and trust to the future for the scientific explanation!"

It goes without saying that here in Australia the continent is too vast, the population too scattered, the cultivated area too insignificant, to justify the establishment of a complete system of similar hail-preventing stations. It is not improbable, however, that in years to come some of our Colonial Governments, or perhaps the more powerful Government of a federated Commonwealth, may select some of the most densely populated and more exposed districts and start these experiments on the lines indicated above. The guns could be had probably for the mere asking from the military and naval authorities, who have always on hand a lot of obsolete guns quite useless for war purposes, but perfectly sufficient for cloud shooting. It might be found also that guns are not the only suitable appliances, but that fireworks, kites, or light balloons carrying some sort of explosives might also answer the purpose, and be cheaper or more handy or easier to procure.

Once human investigation is bent in a certain direction, there is no knowing where it might stop and what wonderful discoveries it might make on its way. Even at the present time it is not too utopian to think that the time might come when Mr. Wragge's meteorological stations, which are now of a purely observatory and warning nature, might become preventive also, and deliver the farmer from some of his most dreadful enemies.

In the meantime we should not be idle. Let us take the best steps we can to attenuate as much as possible the effects of the so-far inevitable hailstorms. One of the simplest and one well worth discussion in our Farmers' Associations would be the establishment of some sort of *Mutual Insurance against damage from hailstorms.* In some countries such insurances are undertaken by private companies. In some cantons of Switzerland they have been taken in hand by the State itself, and are made compulsory. Every farmer contributes a trifle on his acreage under crop, and the proceeds are sufficient to indemnify the victims of the terrible calamity, and to pay for the very small working expenses.

As preliminary steps to the establishment of such desirable institutions, it would be advisable—

1. To request the Chief Weather Office to publish annually a map of hailstorms with all possible details.
2. To request the Registrar-General to publish annually a detailed statistic of all damages done by hailstorms.
3. To collect all possible information on the establishment and working of hail insurance in other countries.

Such steps would no doubt furnish ere long both the financier and the statesman with sound and reliable data upon which to base the establishment of a workable system of insurance against damage from hailstorms, and thus would be in some measure attenuated one of the most dreadful and undeserved drawbacks of our agriculture.

SALTBUSH.

For the past eighteen years exhaustive experiments have been made at the Agricultural Experiment Station of the University of California, in the cultivation of various varieties of saltbush. The results of these experiments have just been published in a bulletin (No. 125) of the University. Summarising the results, the director, Professor Charles H. Shinn, says that the tests of some species have extended over the greater part of the State, and that *Atriplex semibaccata* appeared to be the most useful of all the species.

Mr. J. H. Maiden, Government Botanist, New South Wales, on the other hand, mentions an "Old Man Saltbush" (*Atriplex nummularia*) as one of the plants whose value as a fodder plant it would not be easy to exaggerate. Its advantages are that it is nutritious, it yields an enormous quantity of feed in a short time, it seeds enormously, and it may readily be propagated by cuttings. It has been so much appreciated that it is getting scarce.

Much attention is paid to this plant at the Cape, where cattle, sheep, horses, donkeys, &c., feed on it in preference to the native saltbush, *A. holimus.*

The *A. nummularia* grows to a height of 10 feet and even more between the Narran and the Warrego, and in the arid districts of Queensland, South Australia, and Victoria.

Mr. G. Valder, Principal of the Hawkesbury Agricultural College, New South Wales, made a long series of experiments with saltbush when he was manager of the Wagga Wagga Experiment Farm.

The seeds were sown in beds, and the young plants transplanted out when about 5 inches high into a large plot of well-worked, sandy soil. They were put in drills 4 feet apart, the plants being 2 feet apart in the drills. By-and-by every other plant was taken out, and in ten months the plants were from 6 to 7 feet high and touching each other. Propagation by cuttings was also very successful. Experiments were made with *A. nummularia; A. halimoides,* a species of a dwarf-growing habit; *A. leptocarpa,* which is of a creeping nature and does not grow so strongly as the former, although it thrives well; *A. semibaccata,* one of the best of the dwarf-growing salt-bushes; *Rhagodia*

hastata, a plant which is so easily propagated that there is no reason why this species should not be grown in large areas. The smallest cutting will grow. *Kochia aphylla*: Pastoralists who have had experience with this plant say that it is one of the very best of saltbushes. Mr. Valder further remarks that the general idea seemed to be that saltbush will not thrive in any soils except those containing a heavy percentage of salt, but, so far, the trials at Wagga Wagga had proved the opposite, as several of the species, after two or three cuttings, had grown stronger than ever.

Mr. John Duff, Inspector of Forests, supplies the following information with respect to the cultivation of saltbush, which we reproduce from the *Agricultural Gazette* of New South Wales:—

Plantations of saltbush 1 chain wide would contain seven rows of plants 8 feet apart, leaving 5 feet between the two outer rows and the fences, and this would give an average of forty-nine plants to the square chain. In the autumn of the first year of planting, the saltbush cuttings would have grown to a height of 4 to 5 feet, and might then be clipped with hedge shears and the clippings thrown over the fences to the stock. At the end of the first year the plants could be layered, an operation easily performed by forming a drill about 4 inches deep in the soil for each branch, pegging them down in the drills and covering as much of the branches as possible with soil, leaving their tops above ground. The layers root readily, and in a few months could be cut off, dug up, and planted in new enclosures.

To preserve the saltbush from destruction and prevent its total extinction, it is absolutely necessary to grow it in enclosed plantations, only cutting the young shoots off the plants for fodder during period of drought (which does not injuriously affect the saltbush), when grass and other herbage are insufficient to keep the stock alive.

It is well known to pastoralists that the saltbush, which is a very brittle-wooded plant, is quickly destroyed by being broken, eaten down too closely, and all young shoots eaten off as they appear, so that the necessity for growing it in enclosures will be obvious; and it is no exaggeration to state that on all stocked runs whereon the saltbush grew it is now almost extinct.

For producing the best qualities of beef, mutton, and wool, it has been proved that no other fodder plants or grasses equal the saltbush. The permanency of enclosed plantations, saving of stock, and keeping the animals in fair condition during periods of drought would compensate pastoralists tenfold for the outlay in forming these plantations, and would be the means of alleviating much distress and suffering to pastoralists and stock.

In sowing seeds of the saltbush on alkali soil, it is advisable not to cover it, but merely "firm" it into the soil; on arid uplands a slight covering of about one-eighth of an inch of soil is necessary. Germination tests of three-year-old seed were made in 1897 by Mr. G. H. Wright, of the University of California, and the results plainly showed the advantage of slightly covering in non-alkali soils. In the following table are shown results of germination tests which seem to show that a covering in ordinary non-alkali soils is an advantage, but it must evidently be slight:—

Soil Covering.	Date of Germination.	Percentage of Healthy Plants.
½ inch	9th August	70 per cent.
,,	10th ,,	50 ,,
1 ,,	11th ,,	45 ,,
2 ,,	12th ,,	25 ,,
Not covered	16th ,,	30 ,,

Another test, respecting the amount of moisture best applied, showed that seed sown on the surface and watered every day germinated 75 per cent.; seed similarly sown, but watered every third day, germinated 88 per cent.; seed that was not watered till the fifth day failed to germinate.

Many saltbushes can be propagated from cuttings, but the cheapest and the best method is from seed. These can be sown in boxes and transplanted to the desired fields, where they easily root and soon, from self-sown seedlings of subsequent seasons, cover the entire ground. More vigorous plants and a better root-system are obtained by sowing where the stand is desired.

It is often desirable, however, to transplant seedlings. They may be set in rows 4 feet apart on light or hardpan soils and 6 to 8 feet apart in alkali soils. The plants may stand from 1 to 4 feet apart in the rows. The seedlings should be well hardened and 3 or 4 inches high. The tops should be pinched back, taking off two-thirds of the growth; they are treated like young cabbage or tomato plants—firming the soil about the roots. The saltbush transplants easily. At Paso Robles, in 1898, 100 plants were taken from seed boxes, pinched back, set out, watered once, and shaded for 48 hours. The test was a hard one, as all of the soil was purposely shaken from the roots, and at the end of 48 hours the plants were exposed to the full sunlight; but 85 per cent. grew and throve. The individual saltbush which penetrated the hardpan, and is illustrated on Plate CLXXXIII., was a transplanted specimen. So far as observed by studying the root-system of the plants grown at Tulare sub-station, where water is abundant at less than 20 feet, the saltbush does not need to go deeper than 5 feet. Even in the driest seasons, when grain crops cannot find sufficient moisture and perish, the saltbush thrives, making heavy growth. The photograph on Plate CLXXXIV. clearly illustrates the root-system of a typical alkali-soil specimen, from Tulare sub-station, taken by Professor Loughridge. This should be compared with the surprisingly different root-system of the saltbush in Paso Robles on non-alkali and non-irrigated land, which is shown in Plate CLXXXV.

But the most important discovery from this experiment at Paso Robles (says Mr. C. H. Shinn) was that the saltbush grew well on a soil that was not only dry and uncultivated, but was also underlaid by hardpan. Many borings over the tract have determined the depth of surface soil, and in many places also the thickness of the underlying hardpan. Plants have only from 1 to 2 feet of open soil in which to grow before they find a hardpan of from 20 inches to 6 feet in thickness through which the roots of but few species of plants can penetrate. The native oaks, English oaks, mulberries, and locusts do indeed slowly extend through it, but fruit trees merely spread out their roots on its surface for some years, then cease to grow and finally die. When wet by rain, this hardpan becomes easy of penetration, a fact of which the saltbush takes advantage, starting growth as it does with the first autumn showers.

Regarded as a fodder plant, the value of the saltbush will be appreciated when it is remembered that in the selection of foods the chief nutrient to be considered is the protein or nitrogenous ingredient. The saltbushes range high in this most important ingredient. The green fodder shows an average of 3·46 per cent. of crude protein, and 10·53 per cent. of free nitrogen. Made into hay, the average is 12·89 per cent. crude protein, and 39·57 per cent. free nitrogen, according to the analysis made by Professor W. A. Dixon, New South Wales. The average percentages of fat and starchy matter in the saltbushes are less than those found in cereal hays. But in the case of the latter nutrient, the average is almost identical with the figures named for alfalfa and burr clover. In making up a ration, Mr. M. E. Jaffa, of the California University Agricultural Experiment Station, assigns to the saltbush hay about the same digestive co-efficients as those for oaten hay. The digestibility would be increased greatly if the material were cut into small pieces. It is not advisable to feed the saltbushes alone, particularly in the air-dried state, owing to the high percentage of saline ingredients and the general uninviting appearance and condition of the saltbush hay. Sheep and cattle have, however, in cases of emergency existed altogether on this material through an entire season. It would be most unwise to substitute *A. semibaccata* for a cereal hay. The better plan would be to feed a very small amount of saltbush with considerable hay;

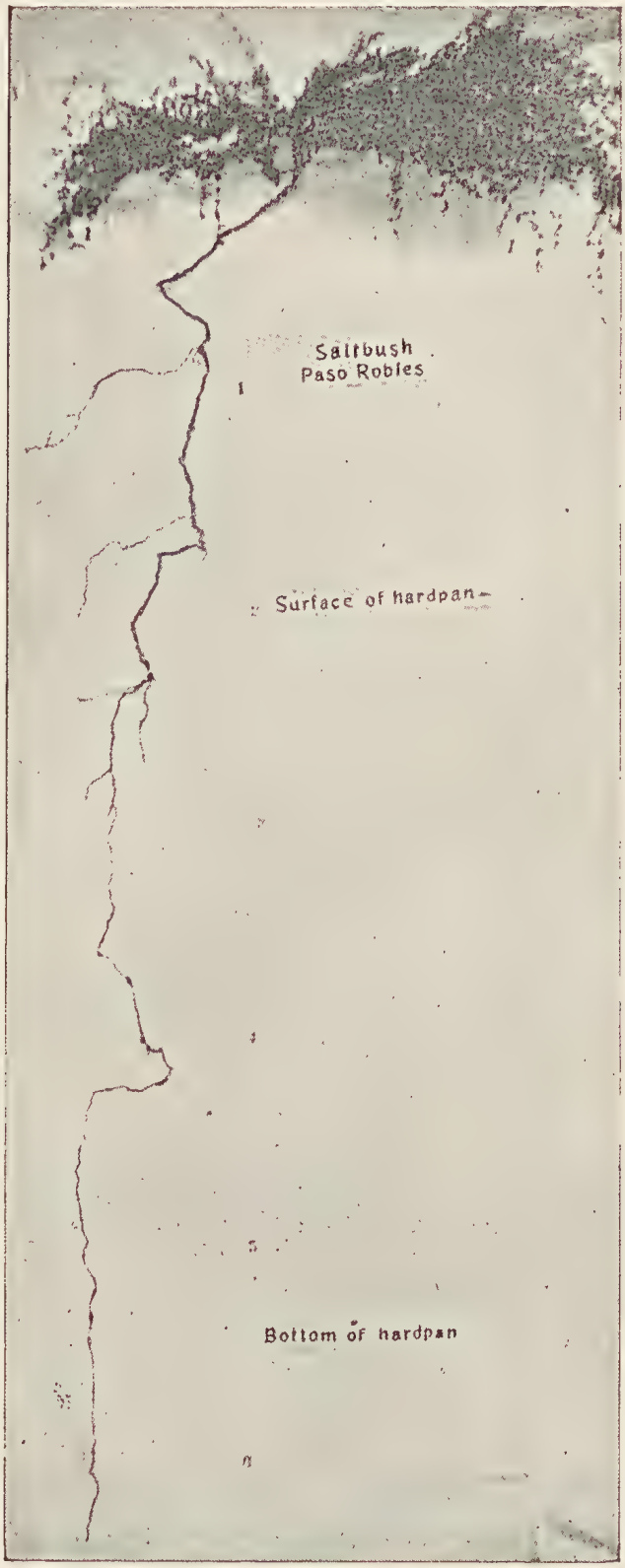
Plate CLXXXIII.

ATRIPLEX NUMMULARIA.
(Old Man Saltbush.)

Plate CLXXXIV.

ROOT SYSTEM OF ATRIPLEX SEMIBACCATA IN ALKALI SOIL.

Plate CLXXXV.



ROOT SYSTEM OF ATRIPLEX SEMIBACCATA IN AN UPLAND SOIL.

then increase by degrees the quantity of saltbush, and decrease that of cereal hay, till the proportions are about equal. If the green saltbush is used, then the hay should constitute about one-third of the roughage of the ration.

The question still to be settled is whether the large amount of saline ingredients will be harmless to all kind of stock; *e.g.*, milch cows. Assuredly no salting will be necessary, and, if no purgative effect is noted, no other disadvantage need be apprehended.

The following is the table above alluded to:—

Table—Showing the Composition of Different Fodders.

Name and Locality.	Percentage Composition.					
	Moisture.	Pure Ash.	Crude Protein.	Crude Fibre.	Nitrogen Free Extract.	Crude Fat.
Green.						
A. semibaccata—Tulare	78·03	4·58	2·75	3·75	10·41	·48
A. semibaccata—Paso Robles	75·00	4·93	3·93	5·58	10·15	·41
A. campanulata—Australia	75·00	5·98	3·06	4·53	10·87	·56
A. nummularia—Australia	75·00	7·82	4·11	1·81	10·71	·55
Average	75·76	5·83	3·46	3·92	10·53	·50
Alfalfa, average for California	75·04	1·80	4·91	6·34	11·09	·86
Snail clover, average for California... ...	81·25	2·07	2·85	4·66	8·41	·76
Alfileria, average for California	80·00	1·72	2·83	4·72	9·81	·92
Hays.						
A. semibaccata—Tulare	7·05	19·37	11·64	15·88	44·05	2·01
A. semibaccata—Paso Robles	10·00	17·74	14·14	20·18	36·54	1·47
A. campanulata—Australia	10·00	21·53	11·01	16·30	39·13	2·01
A. nummularia—Australia	10·00	28·15	14·79	6·51	38·55	1·98
Average	9·02	21·70	12·89	14·72	39·57	1·87
Alfalfa, average for California	10·95	6·43	17·60	22·63	39·31	3·08
Bur clover—Petaluma	8·95	5·00	13·65	30·38	38·22	3·60
Oat hay—Santa Clara	10·38	6·75	8·31	23·85	47·91	2·80
Wheat hay—Danville...	11·67	6·75	6·48	18·72	54·33	1·85
Common barley hay—Tulare	6·44	7·15	11·11	22·55	50·37	2·38

FLAX AND HEMP IN FRANCE AND ENGLAND.

France appears to be the happy hunting-ground of bounty-seekers. For several years the Government has been trying to induce the farmers to grow flax and hemp, and a fund amounting to £100,000 has been devoted to paying bounties on these products. Over four years ago, in 1895, the growers received a bounty of 68 francs per hectare (£2 13s. 10d. per 2⅔ acres). In 1898 the area under flax cultivation was so reduced that the bounty was raised to 95 francs (£3 15s. 2d.) per hectare. There were then only 47,000 acres under flax and 17,370 under hemp. The high bounty appears to have stimulated sowing to a small extent, as the Minister of Agriculture has recently announced that the bounty to be paid to growers for the crops of 1899 is 92½ francs per hectare, or 2½ francs less than in 1898, but still equivalent to nearly 30s. per acre.

The effort recently made to induce farmers to grow flax in England does not appear to have been attended with any success. A return just prepared shows that the total flax area has fallen from 895 acres in 1898 to 465 acres this year. Lincolnshire has dropped from 109 to 20 acres, Norfolk from 10 to 5 acres, while the East Riding—the largest flax-growing county—has reduced its area from 258 acres in 1898 to 106 acres now.

ANALYSES OF COMMERCIAL FERTILISERS.

THE following analyses of fertilisers made by the Agricultural Analyst of Fertilisers has been published at the instance of the South Australian Minister for Agriculture, and they will doubtless prove of interest to sugar-planters and others, especially in view of the recommendation by Dr. W. Maxwell in his report on the sugar industry of Queensland:—

MINERAL SUPERPHOSPHATE.

Vendor.	Brand.	Water Soluble Phosphate.		Citrate Soluble Phosphate.	
		Vendor's Guarantee.	Analysis of Agricultural Analyst.	Vendor's Guarantee.	Analysis of Agricultural Analyst.
Adelaide Chemical Works ...	Mineral Super ...	29·5	33·07	8·5	4·06
Clutterbuck Brothers... ...	United Alkali Co.	36·0	36·97	...	3·27
Clutterbuck Brothers... ...	Special	36·0	41·6		
S.A. Farmers' Co-operative Union	United Alkali Co.	36·0	36·97	...	3·27
George Wills and Co.,... ...	United Alkali Co.	36·0	36·97	...	3·27
Elder, Smith, and Co. ...	Lawes	36·0	38·6		
Australasian Implement Co.	Lawes	36·0	38·4		

BONE AND GUANO SUPERPHOSPHATES.

Name of Vendor and Manure.	Water Soluble Phosphate.		Citrate Soluble Phosphate.		Acid Soluble Phosphate.		Nitrogen.		Potash.	
	Vendor's Guarantee	Analysis by Agricultural Analyst.	Vendor's Guarantee.	Analysis by Agricultural Analyst.	Vendor's Guarantee.	Analysis by Agricultural Analyst.	Vendor's Guarantee.	Analysis by Agricultural Analyst.	Vendor's Guarantee.	Analysis by Agricultural Analyst.
Adelaide Chemical Works (Bone Super) ...	16·05	14·6	15·1	16·7	5·91	7·5	3·2	3·05	0·25	0·24
Adelaide Chemical Works (Guano Super) ...	12·7	18·12	20·9	14·62	3·1	2·85	1·07	1·05		
E. and W. Hackett (Sugar Co. No. 1 Super)	35	28·81	...	8·29						
E. and W. Hackett (Sugar Co. No. 2 Super)	33	33·8	...	...	...	...	1·61	1·68	1·0	1·02
E. and W. Hackett (Sugar Co. No. 3 Super)	28	31·65	...	...	...	...	3·29	3·26	2·0	1·05
E. and W. Hackett (Sugar Co. No. 4 Super)	24	28·37	...	...	...	...	4·94	4·76	4·0	3·98

BONE AND ANIMAL MANURES.

Name of Vendor and Manure.	Tricalcic Phosphate.		Nitrogen.		Price per Ton.
	Vendor's Analysis.	Analysis of Agricultural Analyst.	Vendor's Analysis.	Analysis of Agricultural Analyst.	
	Per cent.	Per cent.	Per cent.	Per cent.	£ s. d.
L. Conrad, Adelaide (Bonedust)	49·9	49·9	3·07	3·23	5 5 0
Crompton and Son, Adelaide (Bonedust) ...	46·67	46·93	3·92	3·94	5 10 0
Adelaide Chemical Works (Bonedust)	43·4	46·27	4·14	4·14	5 5 0
F. W. Wittwer, Hahndorf (Bonedust)	45·31	46·2	3·84	3·92	5 10 0
Baker and Co., New Thebarton (Bonedust) ...	44·5	44·75	4·02	4·06	5 5 0
E. Anders and Sons, Freeling (Bonedust) ...	40·43	44·31	3·7	3·71	5 5 0
L. Mehrtens and Co., Adelaide (Bonedust) ...	38·7	39·94	4·01	4·01	5 5 0
Excelsior Manure Company (Bonedust)	35·0	36·66	2·57	2·71	5 0 0
C. F. H. Stockmann, Kapunda (Bonedust) ...	34·9	44·44	2·91	3·5	5 0 0
E. and W. Hackett (Bone Phosphate)	60·0	65·49	0·5	0·56	4 15 0
E. and W. Hackett (Trotter Manure)	31·0	25·97	1·25	6·97	5 0 0

Sulphide of Ammonia from S. A. Gas Company—56·67 per cent. ammonia.
Australian Potash from E. and W. Hackett—24·9 per cent. potash.

W. L. SUMMERS, Inspector of Fertilisers.

Plate CLXXXVI.

ALGAROBA; OR, MESQUIT BEAN.

THE ALGAROBA; OR, MESQUIT BEAN (*PROSOPIS JULIFLORA*).

By G. B. BROOKS,
Overseer, Kamerunga State Nursery.

In many parts of Queensland there is, unfortunately, a period of the year when, owing to lack of moisture, the grass gets dry and parched, losing most of its nourishment. In these localities the stock has to depend almost entirely on this withered herbage as a means of existence, and suffers in consequence. Something that would come in useful and supply a stock food, even though in small proportions, at such a time, and would cost little or nothing by way of cultivation, ought to be of interest, and, at least, lay claim to a little attention from the large stockowner to the small selector.

In this respect the Algaroba or Mesquit bean is worthy of consideration; for both from personal observation and information gathered from various sources I find that this tree possesses qualities sufficient to draw it from its obscurity here in Queensland, and to give it a place among those plants having a high economic value.

Not only is it a tree that will thrive and flourish in circumstances such as are described above, where it is generally so difficult to obtain anything of the nature of fodder, but it gives large crops of beans, valuable as stock feed, with a high fattening value, and, moreover, remains in bearing for some considerable time.

Another point in its favour is that it supplies the food to the stock, so to speak, automatically—that is, it drops its pods as soon as ripe, thus doing away with any labour or expense in picking and feeding by hand.

The Algaroba belongs to the large order of Leguminosea and sub-order Mimosæ. There are several species of this tree scattered over the warmer regions of Asia, Africa, and America. The seed of the tree growing in the Kamerunga State Nursery came from Honolulu, where the tree is to be found growing in large numbers. Some of the species only attain the shrub form; others, such as *Prosopis juliflora*, the one under notice, grows into a tree some 30 to 40 feet in height, and is, moreover, well armed with sharp spines or prickles. The branches are pendulous or drooping; and the leaves being small give to the tree a rather graceful, feathery appearance. The flowers are rather inconspicuous, being small and of a yellowish-green colour. In fact, it is difficult to tell a short distance off whether the tree is under bearing or not.

When ripe, the pods are of a buff colour, somewhat flat in shape, and from 5 to 8 inches long, in appearance not altogether unlike the ordinary French bean.

The pods have many uses ascribed to them, but the most important one, perhaps, to us in Queensland is, as has already been pointed out, its value as a food for stock. This value lies in the pods being filled between the seeds with a sweet mealy substance which is very nutritious, and of which horses, cattle, and pigs are very fond, the Nursery stock bearing this out.

According to various authorities, the Algaroba ripens its pods at different seasons of the year, and is very prolific, each tree yielding many bushels of pods. This point has not yet been fully determined at this Nursery, the tree growing here being only five years old and under bearing for the first time; however, it has already given fair promise of carrying out the qualities ascribed to it. It commenced to ripen its pods in the end of November, and still continues under bearing up to date (28th February).

It has been found impossible to keep a correct account of the quantity of pods ripened, from the fact that one of the surface drains of the Nursery runs right under the tree, and the exceedingly heavy rains during the month of January (48·580 inches) were the means of carrying away a large quantity of the ripe pods, as they fell from the tree, into the scrub adjoining the Nursery.

However, it may turn out that the seed has not been altogether lost, for, germinating readily as they do, a young forest of Algarobas may be the result.

During Dr. Maxwell's visit to Queensland a short time ago, he paid a visit to the Kamerunga State Nursery, and, knowing that the doctor came from where the tree is said to be of such value, he was shown the Algaroba, which he seemed rather surprised to see growing here. The character he gave it was a very flattering one indeed, explaining how valuable a tree it was, and that it was largely grown in Hawaii, where it was such a boon. The horses and cattle, he said, got absolutely fat on the pods, and were to be seen standing under the trees waiting for the pods to fall. He also mentioned its powers of withstanding drought, and the fact that it would grow almost anywhere, also remarking how valuable a tree it ought to become in this colony.

Of the many uses of this tree and its products, mention is made in Bernays' treatise on "Cultural Industries." There, quoting from reports of the Department of Agriculture, U.S.A., it is spoken of as a common tree of the deserts. As a food for human beings, the bean, whole and ground into flour, would appear to be an important product. According to these reports, some of the other uses to which it can be put are as follows, though, of course, it has not been possible to verify them here as yet:—

As a food, it says:—"Travellers, both Indian and whites, chew them [the beans] as they journey on. They are not only nutritious, but are preventive of thirst, having an agreeable blending of acidity and sweetness somewhat like an early harvest apple."

As the pods ripen, they are gathered and stored for winter use, and the dry pods are pounded and reduced to a powder which, being mixed with a little water, is pressed into large, thick cakes of several pounds weight and dried in the sun.

The flour also, being very sweet, when mixed with water forms an agreeable drink, and when made into gruel is very palatable. A drink is also made by fermentation, and excellent vinegar can be made from the pods.

The gum that exudes from the tree, on being perforated by insects, is often eaten.

With regard to the timber, &c., the report says:—

Fences made of this timber in Southern Texas have been known to stand in a perfect state of preservation for more than fifty years. It resembles *lignum vitæ* in hardness and durability, and takes a polish like mahogany.

Not only the bark but the whole body of the tree is rich in tannin, an analysis of shavings of the wood, made by the United States Department of Agriculture, showing that, as compared with other tanning materials, it was very valuable, yielding a considerably higher amount of tannin than many other sources.

A gum, much resembling gum arabic, exudes in considerable quantities from the tree, and is by no means an unimportant product. Besides being exported, it is largely used in the home market for various technical and medicinal purposes, such as gum drops, jujube paste, mucilage, &c.

For those who desire to give the Algaroba a trial, it may be mentioned that seeds are available for distribution at the Kamerunga State Nursery, on application being made to the overseer. The seeds, unlike those of many other trees, germinate very readily, some of the last lot put in here showing through the ground in less than a week. A large quantity of plants will in course of time be available for distribution to those who prefer such to raising their own from seed.

In planting out the Algaroba, ordinary care is sufficient. Some means, however, must be devised to keep the horses and cattle from breaking it down until it has a fair start, at the same time keeping the weeds from choking it. This being done, the tree will soon establish itself and make rapid growth.

It will be found to have a slight tendency to grow somewhat straggling; therefore it is advisable to prune off the lower branches, so as to encourage it to grow one straight stem and grow tall, in which condition it looks best and gives the best shade.

If planting a few trees in a large paddock, it is better to keep them well apart, as the ripe seeds on dropping from the tree get scattered about, and springing up of themselves develop in course of time into mature trees.

In reference to the foregoing, the late Baron F. v. Mueller, in his work on Select Extra-tropical Plants, says:—The *Prosopis* is vernacularly known as the Cashaw, Mesquite, or Algaroba tree. It ranges from California and Texas to the southern parts of the La Plata States. A thorny shrub, growing finally to a tree of 60 feet high, with a stem 2½ feet in diameter; adapted for live fences. Thrives in damp, saltish air and at a sea-level (J. W. Dutton). May send its roots to great depth, exceptionally to 60 feet, to reach underground water (Professor Sargent). The wood is durable and of extraordinary strength and hardness, fit for select furniture particularly, assuming, when polished, the appearance of mahogany. This (*P. dulcis*) is one of the species yielding the sweetish Algaroba pods for cattle fodder, and utilised even in some instances for human food. The pods of the various kinds of *Prosopis* are adapted only for such animals as chew the cud, and thus get rid of distending gases (R. Russell). Argentina Algaroba pods contain, according to Sievert, 25 to 28 per cent. of grape sugar, 11 to 17 per cent. of starch, 7 to 11 per cent. protein, 14 to 24 per cent. of organic acid, pectin, and other non-nitrogenous nutritive substances. They are also comparatively rich in potash, lime, and phosphoric acid. A sparkling drink, called "aloja," is made of the fruit. This (*P. dulcis*) and some allied species yield the Algarobylla bark for tanning; the leaves contain, according to Sievert, 21 per cent. tannin. The pods also of several species are rich in tannic acid. These varieties, according to Bentham, are: *P. horrida*, *P. juliflora*, *P. siliquastrum*, *P. glandulosa*. Particularly the latter variety exudes a gum not unlike gum arabic, and this is obtained at times so copiously that children could earn two or three dollars a day in Texas while gathering it, latterly about 40,000 lb. being bought by druggists there. Pods of some *Prosopis*, used as fodder, have caused the death of horses in Jamaica by over-feeding. *P. juliflora* has not found favour in India. In some places this kind of plant is subject to the attacks of boring insects.

JADOO FIBRE—HOW TO USE IT.

Since Jadoo fibre was introduced to Australia in 1896 by Mr. W. R. Virgoe, as agent for the Jadoo Company in England, many people have tried it, and report very favourably on its qualities as a plant food. All, however, do not possess the knowledge of how to use it. Some indeed have thrown away the fibre after a season, under the impression that it was used up. As a matter of fact, it can be used many times over; in fact, it has not been ascertained yet when it becomes exhausted. Colonel Halford Thompson, chairman of the company, in a letter to the *Tropical Agriculturist*, Colombo, says:—"It has proved practically *impossible* to wash out the properties of Jadoo fibre, even when exposed to tropical rain."

Preparation for Use.—Jadoo fibre is exported in bales containing six bushels each, hydraulically compressed into a space of 5 cubic feet. In a fresh state, as it leaves the factory, a bale weighs 2 cwt., but owing to evaporation of moisture, on its arrival here in summer, or after being here some time, the weight is considerably reduced, though the substance is there all the same; hence it is always sold by measure.

Before using, the fibre must be thoroughly disintegrated. This can be done in various ways; the simplest being either to use an ordinary washwoman's

board and rub the fibre on it, placing the board on a slant in a box or case as a washwoman would do in a tub; or a piece of the wire netting with which the bale is encased may be tacked on to a flat board and used in the same way. Small quantities may be rubbed between the hands.

Before using in the open ground for trees, plants, vines, &c., or for potting plants, the fibre should be moistened with water, if at all dry, until a bushel weighs about 35 lb.; but if only for seed sowing it may be watered as directed under "Sowing seeds."

It is advisable to prepare only such quantity as is required for immediate use, so as not to unnecessarily promote evaporation of moisture.

Potting Plants in Jadoo.—Always use pots two sizes smaller than required for soil; then proceed exactly as with soil, but pot much more firmly in all cases. If Jadoo and soil are used together, then a pot *one* size smaller than that for soil may be used, and the firmness of potting modified accordingly. Some plants require loose potting in soil; pot these a little firmer in Jadoo. Some, again, such as palms, require very firm potting; use extra firmness with Jadoo; then again, the firmness of potting should be modified by the quantity of soil mixed with the Jadoo. When watering, do it thoroughly. Don't water merely because the surface seems dry. No hard-and-fast rule can be laid down—discretion must be used. Mr. W. Wallace Lunt, a celebrated horticulturist, who has had wonderful successes with Jadoo, may be here quoted. He writes:—"In conclusion, let everyone who has brains grow his plants in Jadoo, but if he intends growing on the 'hit-or-miss' plan let it alone."

Sowing Seeds.—Crock the pans or pots as usual, putting some of the rougher portions of the Jadoo over the crocks. Fill up with the fibre and press evenly down, and water thoroughly; then sow the seed thinly and cover to about its own depth, add a little silver sand, and again press all firmly and smoothly. Be careful not to over-water afterwards. If Jadoo and soil are used, mix thoroughly before use. The above applies to the larger kinds of seeds, from the size of a small pea upwards. For fine seeds—

First sift a small quantity of Jadoo with a sieve, say $\frac{1}{8}$-inch mesh (or smaller according to size of seed). Then proceed as above, but, before sowing, water well and let the pan stand for awhile; then sprinkle about an eighth or a quarter of an inch of the fine Jadoo over the surface, and sow the seed thinly, and sprinkle a little more fine Jadoo and silver sand to cover it (if required), and press all evenly down (the bottom of a pannikin or similar article effects this purpose well). Very fine seeds, such as lobelia, &c., require no covering.

After once watering, or if Jadoo is used in a sufficiently moist state, more water is seldom required till the seeds germinate. Should the surface appear very dry at any time, a slight sprinkle with a fine syringe is sufficient.

Vines.—For Old Vines: Scrape away the earth as near the principal roots as possible; place the Jadoo about 6 inches below the surface, covering up with earth again. The object is to cause fresh fibrous roots to form in the Jadoo. It is specially important that the Jadoo be used moist. For striking vines, the eye, or cutting, should be started in a bed of Jadoo fibre. In planting out young vines put a gallon of Jadoo fibre above and also below the roots. Jadoo liquid diluted 20 to 1 will be found to help on the crop greatly, given when vines are first breaking, and when the fruit begins to colour.

Fig-trees.—Scrape away earth for 6 inches deep in a circle round the stem, varying in diameter with the size of the tree, dividing the earth taken out into two parts; mix an equal quantity of Jadoo with one of them, replacing it next the roots, then put the other half on the top next the surface. The actual quantity of Jadoo used must depend on the size of the tree.

Peach-trees.—Scrape away the earth and put in a bushel of Jadoo to each tree, as close to the roots as possible, replacing earth above it. In planting young peach-trees put a peck (quarter bushel) of Jadoo in with the tree, part below, part above the roots.

Vegetables.—Put about an inch of Jadoo in the furrow in which you sow the seed. This will greatly accelerate germination, and thereby bring crop to maturity at least a fortnight sooner. It also makes healthier and stronger plants.

Chrysanthemums.—Put the cuttings in two-thirds Jadoo, one-third loam with a sprinkling of sand; afterwards use half Jadoo, half-loam, until final shift, when the Jadoo may be reduced or increased as experience dictates.

For chrysanthemums grown in earth Jadoo liquid will be found an excellent mode of feeding, diluted 48 to 1 at first, and gradually increased to 20 to 1. Plants grown entirely in Jadoo fibre do not want this unless very large flowers are required.

Potatoes.—Early potatoes should be placed in the furrow so that they lie in about 2 inches of Jadoo. This will accelerate the maturing of the crop considerably.

Twenty-five tons to the acre of marketable tubers have been grown in poor soil by this method.

TO RENOVATE JADOO FIBRE.

Jadoo can be used many times over; in fact, it has not yet been ascertained when it becomes exhausted. This is a great point in its favour, and tends materially to reduce its original cost. The writer has raised six pans of seedlings in one year with the same lot of Jadoo, adding a little, of course, to make up for what adhered to the plants in pricking out from the pan, the method adopted being thus:—As soon as the young seedlings were pricked off the fibre was spread out in a box, and exposed to the air for a few days to sweeten; it was then watered with Jadoo liquid at a strength of 1 to 20 of water, until sufficient moisture had been absorbed to restore it to its original weight (about 35 lb. per bushel), and then used as at first.

With Jadoo remember these points:—

Thoroughly disintegrate the fibre, leaving no lumps.
Use in a moist state.
Pot firmly.
Don't over-water.

WHEAT-GROWING IN SOUTH AUSTRALIA.

At a meeting of the Colton branch of the South Australian Bureau of Agriculture, Mr. S. W. Kennedy read the following paper on "Sowing Wheat," giving results of his operations for past three seasons:—

In 1897, 200 acres sown and cultivated were ploughed with a Smith's four-furrow plough, put in with a Massey-Harris cultivator and four light horses. Started to sow on 22nd March, and finished 19th April. Sowed 164 bushels and reaped 1,520 bushels. This was one of the best crops in this district, and I considered it was twice as good as the crop adjoining, which was ploughed and sown in the usual style. In 1898, 250 acres new scrub land were ploughed up with the same plough. Started ploughing 14th February, and finished 14th April; started sowing 16th April, and finished the 250 acres on 19th May, with the Massey-Harris cultivator. Sowed 160 bushels wheat, cut 30 acres for hay, and reaped 450 bags wheat. The cultivator made good work in the scrub land. This work was all done by one man. In 1899 sowed with the same cultivator and four light horses 720 acres, all rough land. Sowed 480 bushels wheat, cut 50 acres for hay, and reaped 1,050 bags wheat from 670 acres. Started sowing 22nd March, and finished 8th June. This land was all cultivated by one young boy, who pickled all the seed and also carted it out to the paddock. This is a correct statement of the three years' wheat-growing, and I will leave it to the members to decide if my style of sowing wheat is as good as other methods adopted in this district.

HOME-MADE WINDMILLS.

WE learn from a bulletin of the United States Experiment Station of Nebraska that there is a large increase in the number of home-made windmills in all parts of that State.

They are used for irrigation and other work on farms, and are constructed at little cost by farmers themselves. They are made of different forms, and, as they are not constructed that their vanes can be shifted with changes of wind, they are so fixed as to be driven by the two most prevalent winds, the north-east and south-west, or a few points off either way, thus driving the mill as it changes according to either current of wind. The writer of the bulletin says:—

The importance of this movement, inaugurated by our inventive farmers, is made manifest in that many acres of garden truck, fruit land, and even farm land are irrigated; that stock is supplied with water; that ranchmen and sheep herders are benefited; that dairy products are increased and improved; and that the comfort of the village and the rural home is often enhanced.

The merit of home-made mills has enjoyed such prompt recognition that they are going up daily. Not to the detriment, we are happy to say, of those important adjuncts to the farm, the shop-made mills, *but in addition* to them.

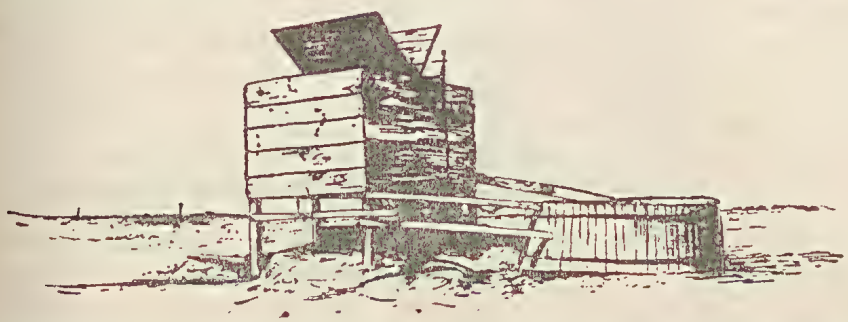
One of the most popular of these home-made mills is the "Jumbo," which is very much like an overshot water-wheel, and is a horizontal or over-shot wind-wheel. All kinds of what would often be waste material are used in their construction, and in this way they are economical in cost. One of these Jumbo windmills is thus described with illustration:—

The Jumbo windmill of Dr. E. O. Boardman, Overton, Nebraska. Built by a carpenter and blacksmith out of new material at a cost of 8·00 dollars (33s. 4d.) Iron axle. Fans 5 by 6 feet. Jumbo box 8 by 12, by 6 feet high. Mounted on posts. Pumps water for 100 head of cattle from an 18-foot well.

This mill serves our purposes doubly, in that it furnishes exact figures respecting a mill built by carpenter and blacksmith, and out of new lumber. This mill with a Jumbo box 6 feet by 8 feet by 12 feet, supporting four fans on an iron axis, cost just 8 dollars. The four fans were each 6 feet square, boarded up solidly. Had there been six or eight fans with but two or three boards, instead of five or six, the results would have been far better, and it would serve as a model. However, as it is, it serves its owner well, and helps to pump water for 100 head of cattle.

Almost any kind of material may enter into their make-up, so they are economical. We have seen old lumber, lath, shingles, split rails, old packing boxes, barrel staves, coffee sacks, and even tin from old tin roofs pressed into the service in the construction of these mills.

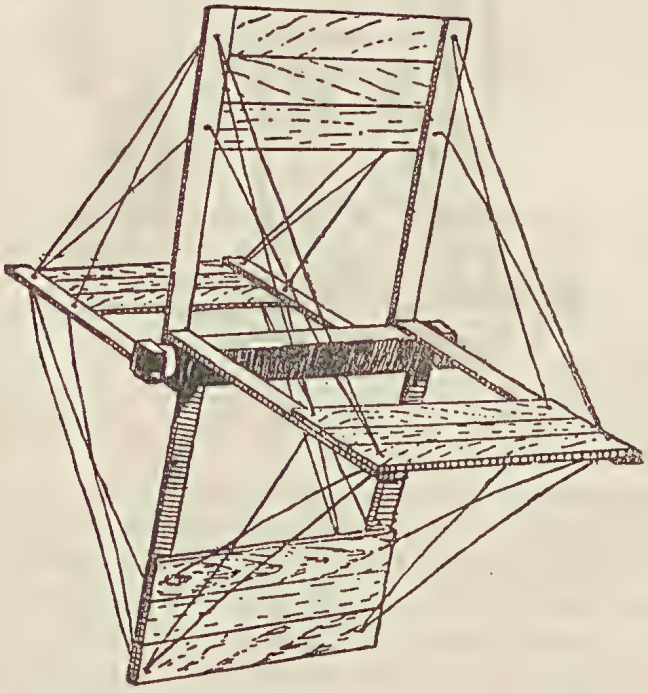
An account is also given of the construction and usefulness of a mill erected by the proprietor of a nursery garden, and is thus illustrated and described:—



A remarkable little Jumbo, which cost but 1·50 dollars (6s. 3d.), yet it pumped sufficient water to irrigate and save the garden truck, the strawberry patch, and the small fruit during the most trying season of drought ever recorded in Nebraska. Box, 3 feet wide, 9 feet long, 6 feet high. Eight fans 3 feet wide by 4½ feet long, supported on a gas-pipe axis.

This mill reverses the ordinary proportions, in that it is narrow and tall. Its proportions are—height, 10 feet; width, 3 feet. Box, 3 feet wide, 9 feet long, 6 feet high. The pump stood about 5 or 6 feet from the mill, and was connected with it by a lever in the ratio of 5 or 6 to 1, which gave it an advantage.

When visited, a fair wind—probably a ten-mile wind—was blowing, and it was pumping vigorously, and continued to work with undiminished force after an additional load of 150 lb. more was added to the pump rod. Means were not at hand for the measurement of its full efficiency, which Mr. Brown estimated for us by saying that the profits from that small mill, during the three distressing seasons of drought, probably exceeded that of the place.



The above diagram shows the way in which the arms and vanes are attached to the spindle, and the construction of some other portion of the machine.

These home-made mills are not only used for pumping, but they can be utilised in doing other work on the farm effected by motive power, and for which

purpose some such mechanical arrangement is required as shown in the appended illustration:—

These attachments enable the mill to saw wood, turn grindstones, churn butter, cut chaff, and perform much other useful work on the farm.

Some years ago, Mr. Gardiner, of Salem, churned his butter by aid of wind power, and we suspect this is not the only instance of this utilisation. With the very satisfactory increase in the erection of large windmills for pumping, there may be this employment of wind power for driving threshing machines, &c.

However, we quite believe that, when happily more peaceful times again prevail, this employment of home-made windmills will have some attention and practical adaptation in some parts of the country.—*Cape Agricultural Journal.*

OVERHEAD NETTING FOR TOMATOES.

REFERRING to an extract from *Garden and Field* in our last issue on tomato-growing, Mr. W. Hobart, Main Range, Toowoomba, writes: I have grown tomatoes on overhead netting for years, and I find it the best of many plans I have tried. The young stalks must be properly guided and trained through the meshes and not be allowed to fall back again. When the vines are full grown, the top of the netting is a complete mass of fruit and leaves, and all the fruit is clean. I make the frame of stout hardwood pegs, 18 inches above ground. Hardwood battens are nailed on the top, and the wire stretched across it. Such a framework is easily taken to pieces and put up again where required.

[No doubt many up-to-date farmers have useful little wrinkles of their own which would be valuable to others. It would be well if they would follow Mr. Hobart's example, and give their fellowmen the benefit of their knowledge, without waiting for us to publish the experience of southern or oversea farmers.—Ed. *Q. A. J.*]

HAY FOR SOUTH AFRICA.

FROM a southern exchange we learn that the ss. "Hyson" will shortly leave Melbourne for Capetown with over 15,000 bags of oats and 24,750 bales of hay. In all probability the hay is oaten, and compressed enormously to allow of over 1,100 tons dead weight, equal to over 4,000 tons measurement, to be carried in one bottom in addition to over 1,500 tons of oats. We have no information as to the conditions under which this forage was shipped, whether by co-operation amongst the farmers, by private speculation, or by Government contract. The latest produce price lists from South Africa quote hay at £11 per ton on the coast, and up to £15 per ton inland. An American firm lately offered to convey hay from the United States to Capetown at £8 per ton freight, but the offer was declined by the British Government. It will be seen that, despite the enormous number of horses with the army already, and an additional 20,000

being regularly shipped to the seat of war, the price of hay is apparently not so high as to make a profitable trade, unless the forage were bought here at an extremely low figure. It is to be regretted that the trial shipment of lucerne could not be sent over in the "Duke of Portland," as our farmers would, by its sale, have been able to determine whether it would pay them or not to ship largely to South Africa.

Dairying.

SLOW *V.* QUICK MILKING.

The *Danish Milk Times* says :—

The question has been asked: Ought milking to be done in quick or slow tempo? To answer this a series of trials have taken place in Germany, one of which we herewith publish. On the farm where the trials took place were the same lot of cows—five in number—alternately milked by an elderly woman, who milked very slowly, and by a very able young milkmaid, who finished her work in a very much shorter length of time. The following figures gives the milk-yield from the same number of cows—milked at the same time of the day—in pounds :—

No.	Slow Milking.	Quick Milking.
1	32	38½
2	31½	51½
3	50	68½
4	40½	43
5	44½	50

As an explanation of this enormous difference it is said that, by the quick milking, the milk-glands were influenced so as to give a larger quantity of milk.

PIGS AND THEIR MANAGEMENT.—No. 5.

FEEDING YOUNG PIGS.

One of the secrets of success in raising young pigs is to feed often and little at a time. Anyone not thoroughly acquainted with pigs would be surprised at the very great number of times during the twenty-four hours a sow suckles her little pigs. For this there appear to be at least two good and sufficient reasons; one is that the sow is unable to carry a large quantity of milk for her numerous family, and the other that the stomach of the pigling is not capacious enough to stow away any great quantity of food at one time.

As the pigs arrive at weaning-time we generally mix with the sharps a small proportion of meal; this we increase as they grow older, until at, say, ten weeks old, the youngsters will thrive well on one-fourth meal and three-fourths sharps.

One most important point in connection with the management of young pigs is the general belief amongst buyers of fat pigs that the meat from a pig which had been kept in a progressive state from its youth up is of a finer quality than the meat from the carcass of a pig which has been allowed, as is far too frequently the case, to live a considerable time as a store pig, in the hope—vain though it be in the majority of instances—that the growing pig will eat and pay for certain odds and ends about the farmyard that would otherwise have been wasted. The bacon-curers are stated to place a higher value per stone on those

fat pigs which are fattened early in life on the concentrated system of feeding—*i.e*, in such a manner that they never receive a check, and are, therefore, fat at a much earlier age than the ordinary pig of the country. The breeders and feeders of pigs must continually bear in mind that the only hope of making pig-keeping really profitable lies in their producing pork of the best quality, and this can only be accomplished by alone breeding from those animals which are possessed in a marked degree of those points such as early maturity, quick growth, fine quality of bone and offal; and then by so feeding the animals that every advantage is taken of the two former essential qualities in their feeding stock.

A pig should make a pound in weight for every day of its life. If it does this, it is ready for market at any time after it is six months old. For the summer markets heavy weights are not wanted. Six or eight months should be sufficient to make all the growth desired.

Give the pigs exercise while they are growing. Give them access to salt, sulphur, and ashes. Do not overfeed at any time, and when they have made size, fatten them as rapidly as possible, and sell them the day they are finished for market.

To secure the greatest gain in feeding pigs that are still suckling, it is necessary that the sows be fed all that they will eat up clean. It is often the case that when pigs begin to eat, the sows are stinted.

It pays better to feed two lots of pigs during the year to 200 lb. than one lot to 400 lb. Young pigs pay better than old ones for the feed they eat, and make better meat. Light, lean pork encourages the use of pork, and out of increased consumption come better markets for the producer.

The older the pig the more its cost to sustain growth, because there is more to sustain. Instead of the rate of growth increasing with the weight of the animal, it diminishes, and every additional pound of growth costs more until the point of profit is reached.

It matters not how well cared for in other respects, the pig will never be thrifty until he has plenty of pure, fresh water. This important point is, perhaps, more often neglected than any other. Slop will not answer the purpose of drinking water entirely, though it is, of course, a partial substitute.

The man who will pen up pigs, or any other animals, in a field entirely destitute of shade, ought to receive the attention of the humane society. Such protection from the sun as a wire fence is hardly sufficient. Shade trees here and there, or a rough shed, are necessary.

The man who produces the largest amount of pork at the least cost, and that of the best quality, will make the most profit. The chief item in the bill of cost is feed. Generally, the cheaper the feed the greater the profit. Corn is not the cheapest food in this country, nor does it when fed exclusively make the best quality of meat for the best markets. A varied diet, of which grass and other green and succulent products, containing more flesh-forming constituents than corn, will be found cheaper and to make better pork. Corn for lard, and grass for meat.

The kind of feed and care the dam receives while the pigs are in the embryo state has much to do with the size, character, constitution, and value of the litter? She should have plenty of exercise, and this is best secured in a stubble sod field that is intended for fallowing the following season. A stubble field is a splendid place to winter the brood sows, if they have access to a straw-stack for shelter. If they are not ringed, all the better; they will root a little perhaps, but all the better for the ground. Pigs confined in small muddy yards take too much earth and filth into the stomach, and as a consequence the bowels become constipated, the system fevered, and indigestion follows, with loss of appetite! The carcass of a pig in this condition gets smaller, while hair and bristles grow just the same, giving the pig some resemblance to a porcupine. The natural food for pigs in the wild state is grass, roots, and bulbs of plants. The necessity for this character of food is well recognised by Nature in providing the pig with a rooter for the purpose of obtaining it. Even after generations of domestication, with an ample supply of sustenance to satisfy all demands,

this proclivity or desire to root, independent of necessity, remains a prominent characteristic. Farmers who have practised from this pointer, and during the winter months have at stated intervals of at least twice a week given one feed of potatoes, beets, artichokes, or turnips, have found that the pigs not only relish them but derive great benefit from them. They are conducive to a perfect condition of the system, stimulating the action of the various organs in the performance of their functions They aid in digestion and assimilation of the more solid food. Brood sows are especially benefited by a liberal supply of root diet while pregnant, as well as their young. Indeed, it is almost compulsory to ensure strong, healthy pigs and a natural farrow.

Lumps of salt should be placed within the reach of all pigs, and a little sulphur mixed with their food will have a beneficial effect. They are also extremely fond of coal cinders, and they will even eat coal itself; this assists digestion. Pigs should also be supplied with pure, fresh water, and the water-trough should be frequently cleaned out. If cleanliness, plenty of fresh air, clean water, regularity of feeding, and shelter attended to, you will not be troubled with much disease or death among your pigs.

COW PEAS FOR SWINE.

A recent bulletin issued by the United States Agricultural Department treats exhaustively of the "Cow pea." As to their value for pigs, the article says: "When cow peas are planted for green manure it is an excellent practice to turn pigs into the field about the time the first peas are ripening. Young pigs thrive amazingly on the succulent foliage and well-filled pods, and the quality of pork raised on such a healthful and nutritious diet is very fine. This is a profitable method of fattening pigs or of preparing them for topping off with corn or sorghum for market. An acre of ripening cow peas will pasture from fifteen to twenty pigs for several weeks, and the gain in fertility from the droppings of the animals during that period will more than counterbalance the fertilising value of the forage eaten. The rapid increase in weight will thus represent so much clear profit, and the farmer is richer by half-a-ton or more of prime pork for every acre planted." In the United States pigs are turned out to pasture just as dairy cattle and horses are in this country. This method has been very successful, and it would be well for our farmers to adopt this system, which has been introduced at the Hawkesbury Agricultural College. Cow pea is not unknown in this country, and has been largely cultivated, but it is apparent to us that, notwithstanding the opportunities that our farmers possess for improving the management of their farm, little advantage is taken of the experience of others, who have made a success of a certain branch of agriculture. There is money in the breeding of pigs, and the farmer who intends breeding should endeavour to study what is required for local purposes. To this end we would recommend that they obtain a copy of that very excellent pamphlet on "Pigs and their Management," by Mr. Geo. Valder, of the H.A.C. These pamphlets can be obtained free by writing to the Department of Agriculture intimating you require one.

Pigs require wood ashes for their best interests. At the Wisconsin Experiment Station, U.S.A., pigs fed exactly alike, except that some of them had wood ashes to eat, showed that where ashes were fed, the bones were much stronger than where they were not furnished.

DANGERS OF SWILL FEEDING.

A writer in *Farm and Dairy* says:—Pig-feeders who live either in or near large towns invariably do their share of swill feeding, and I am sorry to say in the majority of cases it is fetched the return journey from taking the milk or other work, landed home and emptied in the swill tubs, without a thought of what danger may lurk therein. Any danger may be reduced to a minimum if an examination were made with the hands before emptying, and examined again when mixing with the food. Especially in the case of large places, such as barracks, &c., it is a common occurrence to find broken pots, glasses, &c.,

thrown in the tubs. Now, when these happen to get in the feeding trough, the pig, feeling something lumpy naturally makes a dive for it, seizes it in its mouth and crushes it, never feeling what it is in its eagerness to secure its own share of feed. The result is, it generally gets badly cut, and, its mouth becoming sore, is thrown off its feed.

As an instance of the danger, I might mention a case that came under my notice some time ago. I was called in to look at a pig which could not eat, and was consequently running down in flesh as fast as she could. She appeared sore about the mouth, and I advised the man to have her slaughtered. This was done, and when she was opened the carcass was a nasty yellow colour. I took off her head, and, having split it down the centre to the tongue, I examined the tongue and found an ordinary sewing needle with a little sewing thread nearly buried in the tongue at the root. I do not for a minute doubt that she got the needle from her feed into her mouth, and with the action of opening and closing the jaws would press it in the tongue. Now an instance like the above may quite easily and unwittingly happen. I have seen cases where sewing has been done in the afternoon, tea-time has come only too soon, the things are hastily scraped together to make room for tea. When this is over the cloth is taken off and shaken over the swill tub without a thought of what may have gone in besides the crumbs of bread. Some feeders may think to carefully examine swill is time wasted, but I can assure you it will take a lot of time so wasted to pay for a pig if lost by accidents of this kind.

If pigs are kept in sties and fed upon grain from birth until maturity, the pork will cost a great deal more than that of pigs which are allowed a good deal of liberty during the first part of their lives. Still, there are few farms where pigs can be allowed to roam, lest they should get across the owner's boundary and get destroyed for trespass. But there are not many farmers who cannot grow a supply of green stuff during spring, and mangolds, beets, pie melons, kohl rabi, swedes, sorghum, &c., during summer and autumn, to keep a number of pigs in fair condition. It is quite a mistake to feed pigs largely on grain and meal at first. This should only be commenced when they have grown nearly large enough for killing. In America pigs are chiefly fed upon lucerne and similar green feed until within a few weeks of killing, and then they have solid food to make the meat firm and sweet. The pig seems to thrive equally well upon flesh, grain, or grass, but the flavour and quality of the meat is affected by the food, and therefore it must be made firm, sweet, and nutty by the use of grain and similar hard food. All pigs should have a shelter, and the floors of the sties should be of cement, concrete, or slabs well jointed, with a fall to one corner, and a cask or tank to catch all liquid, which should be regularly carried on to the garden. A fair area of land should be enclosed with pig netting, so that the pigs can have a run, and be able to root about. The sties should be flushed with water twice or thrice a week to keep them sweet. No animal can thrive if subjected to extremes of cold and heat, either of which will cause a waste of the body, otherwise waste of food, adding to the cost of producing the pork. Every farmer and gardener should keep a few pigs to eat up all waste, such as skim milk, waste fruit, and vegetables. It will also pay to grow food for them ; for instance, peas, barley, mangolds. Do not keep more pigs than you have food for, as it will not pay to buy food for them. It is a bad plan to keep your pigs half-starved for five or six months; they should be kept in good condition from the time they are born till you kill them.

Mr. Mills, speaking at a meeting of the Kammantoo branch of the South Australian Bureau of Agriculture, said :—During the last two or three years pigs have without doubt been the most profitable animals upon the farm in South Australia, and especially so in these southern districts, owing to the numerous bacon factories which have sprung up in our neighbourhood. So greatly has the pig industry expanded that at a single fortnight's sale the return from the pig branch of the market often amounts to hundreds of pounds, and there seems to be no reason why this business should collapse; but it will be wise for those who raise pigs to study how to feed them at the lowest

possible cost, and to breed the best sorts. In fact, the breed of our pigs has wonderfully improved of late years, but still there is room for improvement. Two or three points are worthy of study by the breeder or feeder. First, is a quiet but vigorous disposition—that is, a good feeder and contented disposition, one that will fight for his food but not be everlastingly squealing for more; second, a well-shaped, short-legged pig, not a steeplechaser, or it will be a job to keep it in the sty; perhaps, also (though it is a minor point), not too much hair, and also a small head set close to the shoulder. As to feeding, this is the most important item of all, and I am not capable of giving any advice, except to feed well, but yet not too well. The most successful pig-feeder will be found in the man who gives his pigs a good comfortable yard or sty, kept as dry as possible, and who feeds them three times a day with plenty, but not too much, as it will be found that a pig once surfeited (and they are very likely to do this if fed indiscriminately) will go back for days before they recover. As to what is the most profitable food is a question which everyone must find out for himself, and will largely depend upon the business ability of the feeder and the state of his purse. Many farmers are feeding with wheat, and it will doubtless be found that some of our surplus wheat will go away in pork. No doubt pigs fatten very rapidly upon it, especially when crushed, but I think if one were going into pigs as a permanent thing, and wheat was likely to keep at the present prices, the best plan would be to have it cut with the binder and carefully stacked and fed to the pigs, straw and all, as they would eat a good lot of the straw and chaff with it, which would cause it to digest better, besides going further, and be less likely to kill them, which it will do if not very carefully fed raw. There is no cheaper food for pigs than skim milk, as it is such a splendid thing to mix with other food, and it is also worthy of thought whether it is not worth while fencing in with a pig-proof fence a few acres in some moist gully to be highly manured and sown with early and late green feed to be fed off with pigs; or grow a crop of green feed, and then peas, to be fed on the ground any way. With our splendid climate for such things and cheap grains we ought to see this business expand until we export pork to all the world, and be able to raise it as cheaply as anywhere in the world.

Mr. Downing, at the same meeting, said he had proved it to be possible to overfeed a pig. Regularity in feeding should be strictly observed when fattening any animal in the stall, giving all that it will eat of a given quality at first, and gradually increasing in quality of food until the desired standard is reached. Generally the appetite is not so voracious after a few weeks' feeding as at first, and consequently they should be fed oftener with smaller quantities. Pollard is by far the best of any for fattening purposes. When whole grain was fed to pigs he found they grew more quickly.

FEEDING BACON PIGS.

A correspondent, writing to the *National Stockman*, says:—Next to the type of pig comes the feed. As much lean meat is desirable, fat-producing feeds, like Indian corn, must be fed sparingly during the first five months of pighood or in the growing period. The poultrymen and the dairymen, from their experience in growing chickens for layers and calves for the dairy, ought to make expert producers of bacon pigs, for the fundamental characteristics of the pullet, the dairy heifer, and the bacon pig are one and the same, and the general line of feeding, care, and exercise are similar. In each case bone and muscle growth is to be sought for, and to this end food of a nitrogenous nature, rather than carbonaceous, must be supplied. Of equal importance is exercise. Exercise will largely modify the effect of carbonaceous food. With plenty of exercise the bacon pig may be fed a much larger proportion of maize than if confined in a small pen. Another important element in the production of the bacon pig is succulence. Green clover, vetches, peas, maize, and rape, either pastured or cut and fed in large yards, are absolutely necessary. Whether bacon pigs should be allowed to pasture at will on these succulent feeds, or cut the feeds and carry to the swine to be eaten in large yards or paddocks, is to the writer an open question.

HOW THE YORKSHIRE, THE BERKSHIRE, AND THE TAMWORTH FARED.

It will interest breeders of pigs to know how the three leading breeds—the Yorkshire, Berkshire, and Tamworth—fared in recent experiments made at the Ontario Agricultural College. The experiment lasted from July till October, and the animals (thirty-six in number) were about eight weeks old when put under trial. The different lots were fed on exactly the same foods (consisting largely of peas, pollard, and whey) all through the experiment. The results showed but little advantage in favour of either of the breeds tested; the average gain during the 112 days over which the experiment extended ranged from 117 to 123 lb., or a little over 1 lb. per pig per day.

The large Yorkshire headed the list with a total gain of 123¾ lb. in the 112 days; the Berkshire coming next with a total gain of 120 lb., and the Tamworths third with a total increase of 119¼ lb. An instructive feature of the experiment was the result obtained as to the quantity of food required by each breed in order to produce a certain quantity of pork. The quantity of grain food consumed in order to produce 100 lb. of weight ranged from 350 to 383 lb., Yorkshires standing at the head of the list as requiring the smallest quantity of grain, the Berkshires second, Duroc Jerseys third, and the Tamworths fourth.

THE RESULTS.

The subjoined table gives the detailed particulars on this score in the case of the three breeds which possess any practical interest for our readers:—

Breed.	Total Gain per Hog in 112 Days.	Average Daily Gain per Hog.	Meal consumed per 100 lb. Gain.
1 Yorkshire	123·75	1·10	350·1
2 Berkshire	120	1·07	369·79
3 Tamworth	119·25	1·06	377·77

At the close of the experiment the pigs were shipped to Toronto, where they were slaughtered and examined by experts. Mr. J. W. Flavelle, managing director of the W. Davies Company, furnished the following report on the characteristics of the different breeds from the bacon-curer's point of view:—

HOW THE YORKSHIRES TURNED OUT.

Great length, side of even depth throughout, sides full of flesh, great length between shoulder and ham, fat even on the back, bone moderate, head small, fore-arm too long, belly only moderately thick, shoulders moderate in size. These pigs have qualities which make them peculiarly suitable for cross-breeding purposes on account of their great length, great development of flesh, and even depth of the side.

HOW THE BERKSHIRES FARED.

Flesh well developed, fat even down the back, well-developed sides of reasonably even depth, rather irregular in length, head moderate with rather large jowl, bone moderate, generally good hogs, but show a decided tendency to uneven development as evidenced by the great irregularity in the length.

AND THE TAMWORTHS.

Moderate bone, a long head, but small jowl, flesh well-developed, slight tendency for fat to arch on the crown, which would possibly cause too many sides to be classed as "fat" on account of thickness at this one point if hogs were moderately well fed, belly thick and very excellent, generally a desirable type of hog, which, with judicious feeding, ought to make good expert sides.

COST OF PRODUCTION.

In this experiment a rather interesting point was brought out. It has been shown by other experiments that the cost of producing a pound of gain in pigs increases as the animal becomes heavier. As the animals included in this test were weighed at regular intervals, and as every pound of meal which they consumed was carefully weighed, an opportunity was afforded to test further the truth of the claim, and a statement of the results is given below. These

results are computed from the gains made and the food consumed by thirty-six hogs, so that they afford very conclusive evidence. In computing the average weights of the hogs, fractions of pounds were neglected, the nearest whole number of pounds being taken in each case :—

While increasing in live weight from 54 lb. to 82 lb., the pigs required 3·10 per lb. meal per 1 lb. gain.

While increasing in live weight from 82 lb. to 115 lb., they required 3·75 lb. meal per 1 lb. gain.

While increasing in live weight from 115 lb. to 148 lb., they required 4·38 lb. meal per 1 lb. gain.

While increasing in live weight from 148 lb. to 170 lb., they required 4·55 lb. meal per 1 lb. gain.

This statement shows that there is a steady increase in the amount of meal required to produce 1 lb. of gain as the hogs increase in weight, and is a strong argument in favour of marketing hogs by the time, or a little before, they reach 200 lb. live weight.

In rearing and fattening pigs the following data may be considered :—Take a young pig weighing 20 lb., dressed weight, at 6d. per lb., equal to 10s. ; 5 lb. of wheat will add 1 lb. pork to its weight, and 400 lb. of wheat will make 80 lb. pork ; total, 100 lb. ; value, say, 4½d. per lb., equal to £1 17s. 6d. Then we have cost of pig, 10s. ; cost of 400 lb. of wheat, say, 16s. 8d. ; total cost, £1 6s. 8d., giving a profit of 10s. 10d. Now take a grass-fed pig weighing 100 lb. dressed, value £1. It would need 6 lb. wheat to add 1 lb. meat to his carcass, and 600 lb. wheat to increase 100 lb. pork. We can reckon this 200 lb. as worth 3d. per lb., equal to £2 10s. The cost of the pig is £1, of wheat £1 5s. ; total, £2 5s., thus showing a profit of 5s. only. So it would not appear to be wise to buy big store pigs for fattening. In my opinion the pure Berkshire will pay better to breed and to fatten than the Berkshire and Essex cross. Great care, however, should be taken in selecting the animals. Always, if possible, get them from a person who takes care of his stock.

EXPERIMENTS IN PIG-FEEDING.

GROUND *V.* UNGROUND GRAIN.

At the Central Experiment Farm of the Canadian Department of Agriculture some experiments have been carried out to compare the effects of feeding pigs with unground grain and ground grain respectively. The grains tried included oats, barley, maize, and a mixture of barley, oats, and peas. The unground grain was soaked for fifty-four hours before feeding. The pigs all belonged to two litters, and were as evenly graded in groups as possible.

A pen of four cross-bred pigs of an average weight of 97¼ lb. were fed on oats and skim milk. The quantity of unground oats consumed by this lot per lb. of increase in live weight was 4·21 lb., and of skim milk 3·45 lb. In order to find out what proportion of the grain passed through the animals undigested, the excrement was carefully collected for twenty-four hours and washed ; from 14 lb. of grain fed 2 lb. 6 oz. of undigested oats were obtained, weighing 22½ lb. per bushel, and when tested for vitality 11 per cent. germinated. The average live weight of the pigs when killed was 170¼ lb. ; a gain of 87 lb.

With the barley four pigs, weighing 97¼ lb. each, were fed for twelve weeks on unground barley soaked in water fifty-four hours, all they would eat, with 3 lb. of skim milk per day to each pig. It required 3·64 lb. of barley and 2·52 lb. of skim milk for each pound of increase in live weight. From 17 lb. of barley fed in twenty-four hours, 2 lb. 2 oz. of undigested grain were separated, which, when dried, weighed 35 lb. to the bushel, but none of the kernels sprouted. The average gain in live weight was 100 lb.

UNGROUND PEAS RETURN.

Four pigs were fed for twelve weeks on unground peas soaked in cold water for fifty-four hours, as much as they would eat, with 3 lb. of skim milk per day to each pig. These pigs consumed 3·33 lb. of peas and 2·35 lb. of

skim milk for each pound of increase. From 17 lb. of peas fed in twenty-four hours only 2 oz. of undigested grain were separated. The average increase in live weight was 107 lb.

Three pigs, of a live weight of 72 lb., were fed for thirteen weeks on unground Indian corn soaked for fifty-four hours, with 3 lb. of skim milk per day to each pig. They consumed 2·90 lb. of corn and 2·31 lb. of skim milk for each lb. of increase. From 11 lb. of corn fed during twenty-four hours there were separated 8 oz. of undigested grain, which, when dried, weighed 40¼ lb. per bushel. The average increase in live weight in this lot amounted to 118 lb. each.

Three swine were fed for thirteen weeks on a mixture of equal parts of unground oats, barley, and peas, with 3 lb. of skim milk per day to each. They consumed 3·20 lb. of this mixed grain and 2·60 lb. of skim milk for each lb. of increase. In this lot the average live weight gain was 103 lb.

The increase in live weight was found to be greatest in the lot fed with maize, and these pigs also showed the least shrinkage in dressed weight.

FEEDING WITH GROUND GRAIN.

Further experiments were made with feeding with ground grain, soaked and dry, the meal being composed of equal parts of oats, barley, and peas, with a half-part of bran. To one pen this meal was fed after it had been soaked for thirty hours in cold water; in the other case it was fed dry and a tub introduced into the pen with water, so that the pigs could drink as often as they desired it. Each pig was given 3 lb. of skim milk per day as in the other tests, and all they could consume of soaked meal in one case and of dry meal in the other case. These pigs were from the same litter, and they weighed about 100 lb. each at the start, there being a difference of only 4 lb. in the total weight of each pen.

The four pigs fed on meal soaked made 1 lb. of increase in live weight on a consumption of 4·69 lb. of meal and 3·61 lb. of skimmed milk, whereas the four pigs fed on the same meal dry made 1lb. of increase from 4·19 of meal and 3·20 lb. of milk. Those fed with dry food made 34 lb. less weight in the same time to the pen, and they consumed 316 lb. less of grain. So that it appears from this experiment that it is more economical to feed meal dry.

One lot of four pigs weighed 407 lb., and the other lot of four a total of 403 lb. At the close of the test the first lot weighed 756 lb., and the second lot 718 lb. Those that were fed on the moist food did not do so well as those that were fed on the dry food until the last four or five weeks of the feeding period. In the meantime they had grown a little more "rangy," and during this latter period they put on weight more rapidly than those fed on dry meal, but there was more shrinkage when they were killed. Those fed on dry grain were shorter, more solid and compact, and they made on the whole more flesh with the consumption of less grain.

The live weight of the first lot fed on soaked meal, fasted fourteen hours, was 743 lb., and the dressed weight twenty-four hours after killing was 540 lb. In the other case, where the pigs were fed on dry meal, the live weight, fasted fourteen hours, was 690 lb., and twenty-four hours after killing it was 545 lb. There was nearly 50 lb. less shrinkage with those fed dry.

The results of these experiments are held by the Director of the Dominion Experiment Farm to show that on the whole the advantage was with the meal as against the unground grain.

The Central Experiment Farm, Ottawa, has carried out a series of pig-feeding experiments, and the conclusions arrived at have been as follow:—

1. It will not pay to cook feed for swine where economy of pork production is the sole consideration.

2. There is a gradual increase in the quantity of feed consumed for every pound of gain in live weight after the average live weight exceeds 100 lb.

3. The most economical time to slaughter swine is when they weigh from 175 to 200 lb.

4. The greatest and most economical gains are made when the swine are able to eat the most feed in proportion to their weight.

5. Frozen wheat may be used as a profitable feed for swine.

6. Skim milk adds most materially to the value of a grain ration, and 100 lb. mixed grains equal about 700 lb. of skim milk. The relative value of skim milk in any ration varies with the amount fed, the poorest return per pound fed being obtained when the proportion of skim milk to the total food is the greatest.

7. The average dressed weight of swine is about 76·44 per cent. of the fasted weight.

8. Skim milk is a most valuable adjunct to the grain ration, when hard flesh is desired.

9 Type of animals fed influences character of meat more than breed—*i.e.*, the fact of an animal being a Yorkshire or a Tamworth will not insure a good bacon carcass, but they must also be of a rangy type, and fed in a certain way.

10. Feeding mixed meal (barley, peas, and oats) with milk usually insures firm meat.

11. The greatest gains from a given amount of grain appear to be made when it is ground and soaked for twenty-four hours. Part of grain fed whole is frequently voided before being digested.

12. Mixed grains are more economical than grains fed pure.

13. Pigs whose rations are limited make, on the whole, more economical gains than pigs that are rushed.

14. Maturity or ripeness of the animal affects the quality of the flesh.

Some of the more advanced pig-breeders regularly supply their hogs with condition powder. This is made with, say, 6 bushels pulverised charcoal, placed in a shallow box or on a floor; add 1½ bushels of hardwood ashes and 6 lb. salt. Mix this thoroughly. Dissolve 1¼ lb. copperas (sulphate of iron) in 3 gallons hot water; sprinkle this on the above through a watering pot, stirring and mixing the whole while slowly sprinkling. Then place the whole, or a good portion, in a self-feeding box.

TEETH OF YOUNG PIGS.

Should the sow carry her pigs beyond the usual period of gestation, it frequently happens that the piglings' teeth will have made an abnormal growth, and in some instances the teeth will have become discoloured to an extent which has led to the common saying that "pigs born with black teeth never do well." These little teeth are often very long and sharp, so that, when the little pigs attempt to suck, the teeth extend beyond the tongue of the pig and prick the inflamed and tender udder of the sow, giving her great pain, which frequently causes her to refuse to suckle the pigs, and sometimes she will attack the little ones with open mouth, when one grab from her powerful jaws seriously injures, if it does not at once kill, the youngster. Unless immediate steps are taken to remove the cause of this trouble, the pigs soon die for want of food, and the sow's udder becomes distended with milk, and inflammation of it follows.

THE REMEDY.

This is simple, and easily applied by the attendant on the sow. He takes up each pig, tucks it under his left arm, opens its mouth with his left hand, and with his right hand and a small pair of pincers he breaks off the erring teeth, and places the pig to the sow; then, by a little of both coaxing and scratching, the sow will turn on to her side; the little pigs, being unable to bite the udder and each other, will quickly relieve the distended udder of the sow and prove a source of pleasure to her instead of an irritant and a cause of pain. Sometimes the sow will become impatient on hearing the shrieks of her little pigs while the operation of dentistry is progressing; if this does affect her, it is best to take the little pigs into an adjoining place out of hearing of the sow.

When a sow is so careful of her pigs that she never lies down without knowing they are safe from being crushed, keep her until she is six years old. She is worth a fortune. Send the nervous fidgety sow to the butcher. She is not a good mother.

There is a wonderful difference in sows in caring for pigs and in handling at farrowing time. Any brood sow ought to be so quiet and so well acquainted with her feeder that she will let him pick up her pigs without much protest.

THREE METHODS OF CURING BACON.

THREE important items must be carefully noted in the process:—(1) Regular density of pickle; (2) uniform heat of cellar; (3) great cleanliness in operations. Curing should be done at a temperature of 50 degrees, or as near as possible to it. Pickle can be made in the following proportions:—

Sodium chloride, 5 lb.
Potassium nitrate, ½ lb.
Water (cold), 2 gallons.

You will perceive I put cold water. Most people boil it, but, practically speaking, salt is as soluble in cold as hot water, and if mixed a day or two before required, and agitated several times, it can be skimmed without boiling.

If you prefer it, add ½ lb. sugar to above—some people like it, some do not. Put in pickle for about three days, then dry salt for about nine days for a pig weighing from 7 sc. to 9 sc. of 2 lb.; larger pigs, two to three days longer.

The way we cure sides of bacon from pigs of from 12 st. to 20 st. is as follows:—Pour 4 gallons of boiling water to ½-bushel of salt and ¼-lb. of saltpetre, stir it till dissolved. When cold, add 1 lb. treacle. Put the bacon in this brine, and keep it under with a heavy stone or bricks. Turn it every two days, and let it remain in pickle for ten days or a fortnight, according to thickness. Large hams, from 35 st. to 40 st. hogs, require one month to five five weeks' salting.

Use no brine, simply rub each piece well with dry salt. Place piece on piece in a wood coal. Leave them six weeks. Rub a little more salt and hang up. For hams, use treacle or sugar, and some saltpetre with the salt. Rub well; put in single on back or skin down in a stone trough. Drip occasionally with their own brine. After six or eight weeks take up to dry, and when dry put up in bags to keep out the skippers. We have twenty-five and twenty-seven scores so managed. Brine makes pork eat hard.—*Scottish Farmer.*

WATER FOR MILCH COWS.

THE watering of live stock is an important part of the farm work. But, while all animals on the farm require more or less attention in this particular, none need it more than the cow giving milk. Many farmers fail to realise the importance of giving their milch cows all the pure water they require both winter and summer. The amount of water a cow will drink depends upon the kind of feed she is getting. Where roots or ensilage is fed the amount of water is considerably lessened, because there is a considerable amount of water in these feeds. Cows, as a rule, require more water during the winter than during the summer when on fresh pasture, and a cow in a full flow of milk requires a great deal more than one not in milk. In fact, a cow cannot give the very best returns in the milk pail unless she is liberally supplied with drinking water.

Several experiment stations in the United States have tested this question with somewhat varying results. At the Copenhagen station it was found that seventy-six cows required an average of 97·9 lb. of water per day, or about 12 gallons each. At the Pennsylvania station it was found that cows averaging

773 lb. in weight confined in stalls in the summer and living on fresh grass drank 61 lb. each per day, while confined in stalls at a temperature of 73 degrees and fed on dry grass they drank 107 lb.

According to Professor Henry, cows, generally speaking, require about 4 lb., or half-a-gallon of water, to each pound of dry matter in their food. A New York authority says that provision should be made for 8 gallons a day per cow in order to be sure of a full supply. At the Geneva station it was found that cows in full milk required $4\frac{3}{5}$ lb. of water for every pound of milk. It follows, therefore, that the heavier the milk the larger the amount of water is necessary.—*Scottish Farmer.*

TUBERCULOSIS.

At a meeting of the Glasgow and West of Scotland Agricultural Discussion Society a lecture was delivered by Mr. Jas. Stirling on "The Responsibilities attending the Milk Supply."

At this meeting the tuberculin test came in for somewhat severe handling. A Mr. Ashe gave his experience with one cow, and Mr. Findlay his with a dozen. In both cases the test was not found correct on *post-mortem* examination. Not much can be founded on Mr. Ashe's single experience, but with Mr. Findlay's the case stands differently. It corroborates the Aberdeen experiments. Of five reacting cows, one was found to be affected and four were sound; and of seven non-reacting cows, two were found to be affected, and four were sound. This second class is the more significant. "A test which allows the diseased to escape is far from reliable," says the *Scottish Farmer*, "and Mr. Findlay is fully warranted in his contention that more experiment is needed before legislation is attempted. In the course of the discussion, Mr. Ashe said he considered that Mr. Stirling had gone to the extreme like many others. He had told them that tuberculin was a reliable test of tuberculosis in cattle. That he denied. He had made some experiments, and he had had two of the best veterinary surgeons in Paisley to examine a cow, and to test her. They said that she reacted, which she did. She was slaughtered, and the organs examined and found to be perfectly sound. Now, were they to slaughter their cattle on the testimony of a diagnostic like that?

Mr. Findlay said that, in regard to tuberculosis, it had not yet been proved that any deaths from it were the direct result of using milk, and they had no right to go on these lines until such was proved. Assuming that it was true that cases came from milk, all they had got to do was to test the cows, and discard tuberculosed ones. So said Mr. Stirling It was the first time he had ever heard it stated that 6 per cent. was a likely proportion of cows to react. He had heard of as many as 30, 40, 50, and 60 per cent, and why the cows in this case should be down to 6 per cent. required some explanation. But supposing it was right, is the tuberculin test reliable? They would all, no doubt, have seen the results of the experiments which were carried out by the staff of the Agricultural Department of the University of Aberdeen, where the animals were tested by tuberculin, and the effects noted, slaughtered afterwards, and examined. He would not go over all the ground, but would just take the case of the cows. Of sixty-five cows which were tested, twenty-one reacted, but when slaughtered thirty-nine were found to be affected. Now, that showed that the tuberculin test did not find out all the affected cows, and if it did not do that, what was the use of it? Perhaps that was one of the most carefully carried out experiments they had had. He had experimented on cases himself—that was on cows which were being fed. He did not like to try the cows in calf, because he had treated one once, and the cow "slipped" calf in a week. A farmer had told him that tuberculin was a grand thing for finding out if cows were in calf. (Laughter.) He had tested some, and the next morning the calves were all lying between the cows in the byre. Well, he (Mr. Findlay) had tested twelve cows, five reacted, and seven did not. Eleven were killed, and of the five reacting cows one

was found to be affected, and four were sound; and of the seven non-reacting cows, two were found affected and four sound. The remaining one "picked" calf twenty-one days after being inoculated. He thought that corroborated the experiments that were carried out from Aberdeen, and he thought that more people should experiment before they tried to legislate.

BLOOD-POISONING IN DAIRY STOCK.

A CURIOUS trouble cropped up at the Toronto Industrial Exhibition, held in August last. A dozen valuable dairy cows died early in the show week, and it was at first suspected they had been poisoned. The investigations of the veterinary surgeons who made the *post-mortem* examinations showed that death was caused by the milk having been pumped back into the cows' udders through the teats after they had been milked out in accordance with the rules. The stale germ-laden milk being absorbed into the blood circulation set up blood-poisoning, some of the udders turning black with mortification in a short time. The board of the fair association decided to withhold the prizes won by any of the animals which died. The fraudulent attempt to obtain prizes by such a gross and ignorant violation of the laws of Nature brought its speedy punishment.

THE DAIRY HERD.

QUEENSLAND AGRICULTURAL COLLEGE.

RETURNS FROM 1ST TO 28TH FEBRUARY, 1900.

Name of Cow.	Breed.	Date of Calving.	Yield.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.			
Isabelle ...	Ayrshire	2 June, 1899	318	4·0	14·24	
Linnet ...	,, ...	19 June ,,	660	3·9	28·82	
Leesome ...	,, ...	12 Oct. ,,	784	3·8	33·36	
Ream Routhie	,, ...	19 Sept. ,,	482	3·9	21·03	
Laverock ...	,, ...	7 Dec. ,,	884	3·8	37·61	
Effie ...	Jersey	16 Dec. ,,	660	4·6	34·0	
Content ...	,, ...	11 July ,,	496	4·4	24·43	
Eileen ...	,, ...	13 Aug. ,,	486	5·1	27·75	
Jersey Belle	,, ...	4 July ,,	305	5·5	18·78	
Stumpy ...	,, ...	1 July ,,	595	4·9	32·64	
Playful ...	,, ...	6 Aug. ,,	312	4·6	16·07	
Ivy ...	,, ...	2 Oct. ,,	347	5·0	19·43	
Opale ...	,, ...	16 Dec. ,,	681	4·8	36·6	
Beatrice ...	,, ...	19 Oct. ,,	394	5·1	22·81	
Bashful ...	,, ...	16 Nov. ,,	414	4·4	20·39	
Connie ...	,, ...	29 Sept. ,,	291	4·8	15·63	
Pet ...	Grade Jersey ...	6 Oct. ,,	442	3·5	19·32	
Scarlet ...	South Coast ...	13 Oct. ,,	578	3·9	25·24	
Misery ...	,, ...	4 May ,,	436	3·7	18·06	
Toughy ...	,, ...	11 Sept. ,,	523	3·5	20·44	
Plum ...	,, ...	3 Dec. ,,	484	3·6	19·51	
Banjo ...	Devon	5 Oct. ,,	356	4·2	16·74	
Broad ...	,, ...	5 Oct. ,,	508	4·2	23·88	
Rosie ...	,, ...	11 Oct. ,,	548	3·6	22·08	
Monday ...	,, ...	24 Oct. ,,	497	4·2	23·37	
Patience ...	,, ...	5 Oct. ,,	471	3·8	20·03	
Spot ...	Shorthorn ...	17 Oct. ,,	412	4·0	18·45	
Plover ...	,, ...	25 April ,,	175	4·1	8·03	
Painter ...	,, ...	4 Sept. ,,	618	3·9	26·99	
Brush ...	,, ...	12 Sept. ,,	585	3·9	25·54	
Blossom ...	,, ...	14 Sept. ,,	441	3·7	18·26	
Florrie ...	,, ...	15 Sept. ,,	571	3·4	21·73	
Kit ...	,, ...	16 Sept. ,,	555	3·5	21·75	
Frizzy ...	,, ...	27 Sept. ,,	582	3·9	25·41	
Kate ...	,, ...	30 Aug. ,,	425	3·8	18·08	
Violet ...	,, ...	1 Oct. ,,	592	3·9	25·84	

THE DAIRY HERD—*continued.*

RETURNS FROM 1ST TO 28TH FEBRUARY, 1900—*continued.*

Name of Cow.	Breed.	Date of Calving.	Yield.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.			
Cherry ...	Shorthorn ...	19 Feb., 1900	158	3·6	6·36	
Guinea ...	,, ...	20 Feb., ,,	118	3·1	4·08	
Laurel ...	Grade Shorthorn	4 Oct., 1899	778	3·6	31·3	
Restless ...	,, ,, ...	4 Oct. ,,	647	3·4	24·61	
Rosella ...	,, ,, ...	9 Oct. ,,	718	3·5	28·14	
Redmond ...	,, ,, ...	6 Oct. ,,	695	3·8	29·57	
Jane ...	,, ,, ...	10 Oct. ,,	589	3·9	25·72	
Shelly ...	,, ,, ...	13 Oct. ,,	673	4·0	30·14	
Peggy ...	,, ,, ...	14 Oct. ,,	441	4·2	20·74	
Stranger ...	,, ,, ...	15 Aug. ,,	635	3·8	27·02	
Empress ...	,, ,, ...	23 Aug. ,,	540	3·6	21·77	
Mundah ...	,, ,, ...	29 Sept. ,,	687	3·7	28·45	
Pokey ...	,, ,, ...	26 Sept. ,,	493	3·6	19·87	
Sally ...	,, ,, ...	23 Sept. ,,	684	3·8	29·1	
Whiteflank...	,, ,, ...	4 June ,,	662	3·8	28·16	
Star ...	,, ,, ...	17 Dec., 1898	584	4·4	28·77	
Ginger ...	,, ,, ...	17 June, 1899	543	4·1	24·93	
Biddy ...	,, ,, ...	18 May ,,	581	4·2	27·32	
Bally ...	,, ,, ...	12 Oct. ,,	610	3·8	25·96	
Beauty ...	,, ,, ...	14 Oct. ,,	578	3·6	23·29	
Leopard ...	,, ,, ...	17 Oct. ,,	545	3·9	23·8	
Trial ...	,, ,, ...	26 Oct. ,,	792	3·7	32·81	
Duchess ...	,, ,, ...	27 Oct. ,,	614	3·9	26·81	
Podge ...	,, ,, ...	1 Nov. ,,	643	3·9	25·07	
Russet ...	,, ,, ...	10 Nov. ,,	665	3·8	28·3	
Rusty ...	,, ,, ...	17 Jan., 1900	814	3·9	35·5	
Polly ...	,, ,, ...	29 Jan. ,,	746	3·4	28·4	
Alice ...	,, ,, ...	13 Nov. 1899	675	3·9	29·47	
Daisy ...	,, ,, ...	21 Nov. ,,	689	3·7	28·46	
Nell ...	,, ,, ...	1 Dec. ,,	515	3·5	20·18	
Damsel ...	Holstein ...	5 Dec. ,,	589	3·3	21·76	

The Horse.

STABLE NOTES.

By W. C. QUINNELL, M.R.C.V.S. Lond.

DISEASES OF HORSES.

Tetanus, or Lock-Jaw.

Definition.—Tetanus is a diseased condition due to a microbe, and characterised by involuntary tonic spasms of muscles.

The spasms are apparently painful, and the animal from time to time is attacked with violent paroxysms. Each attack is followed by a corresponding interval of repose.

Causes.—Tetanus frequently arises in connection with *wounds*, although it is also met with where there is no appreciable cause whatever. It is spoken of as *traumatic tetanus* when it is traced to an injury, and *idiophatic tetanus* when it arises without any apparent cause.

Traumatic tetanus is liable to follow even slight wounds, and is, therefore, in no way depending upon the degree or extent of an injury. It has a tendency to follow wounds in the feet, thighs, quarters, and fore-arm, and this more particularly so when wounds are lacerated or punctured, or when the nerves have received injury.

Wounds occurring in regions where the structure is most tense, and parts that are held firmly together by means of unyielding tissues, seem to favour the development of tetanus than injuries in the laxer tissues.

The operations of docking and castration are often followed by tetanus.

Gastric derangement, due to irritation of the stomach and intestines, caused by worms or other agents, has been known to give rise to this diseased condition. In some instances uterine disorders, following abortion, have frequently given rise to tetanus. Horses, when exposed to cold and damp, especially after being clipped, or after extra severe work or exhaustion, may induce an attack of tetanus.

By some authorities tetanus is considered to be a blood disease, and several reasons have been advanced in support of this view, viz. :—

1. Tetanus often occurs idiopathically without any injury.
2. It is more prevalent in certain districts than in others, and is sometimes enzoötic, affecting several animals in the same district. There is, however, no proof that tetanus is ever contagious.
3. The resemblance to hydrophobia and strychnine poisoning suggests a similarity in the nature of the cause.
4. Tetanus is said to be transmissible to men by eating the flesh of animals which have died of this disease.

Varieties.

Trismus, or Lock-jaw.—When the muscles of mastication are affected.

Opisthotonos.—When the muscles of the superior cervical and dorsal region are especially affected, producing elevation of the head and curving downwards of the spine.

Tetanus lateralis, or Pleurosthotonos.—When the muscles on one side are affected.

Emprosthonotos.—Here the inferior muscles are involved, causing the chin to be drawn towards the heart.

Tetanus may be acute, sub-acute, or chronic.

Symptoms.

When the origin is due to a wound, it usually manifests itself in from ten to twenty-eight days after the infliction of the injury.

Premonitory symptoms are manifested by a stiffness about the neck and lower jaw, and of the muscles near the seat of injury. There is difficulty in mastication and deglutition, together with increase of the secretion of saliva and a characteristic champing of the teeth.

When disturbed, or the horse's head be suddenly elevated, there is a peculiar and characteristic protrusion of the third eye-lid, or technically known as the membrana nictitans over the eyes, which withdraw within the orbits, thus causing the animal to expose the white conjunctival surface at every convulsive retraction.

The stiffness, especially in the muscles of mastication and those in the upper part of the neck, becomes more marked and soon spreads to neighbouring groups of muscles, more especially those in the region of the abdomen, back, and hindquarters.

Then the tetanic condition becomes so marked that it is recognised even by an ordinary observer. The limbs are extended and kept apart; the tail stands out and is elevated, and if moved the animal has a peculiar stiff, straddling gait which shows signs of great discomfort and pain.

The *pulse* in the sub-acute stage is not materially disarranged in the first instance, but in a day or two it becomes accelerated. To the touch it is firm, hard, and incompressible.

In the acute stage the pulse becomes accelerated in the very early period of attack.

The *temperature*, generally speaking, is not markedly high, but rises considerably in the very severe cases.

As a rule, the acts of micturition and defecation cannot be performed.

Quietude and darkness have a tendency of subduing attacks of paroxysms, whereas any disturbance, noises, and light induce attacks.

During these periods of spasms the animal becomes much distressed, and the breathing is accelerated and difficult. The surface of the body is bedewed with perspiration, and the nostrils become dilated and the nose protruded.

TRANSPORT OF HORSES BY SEA.

A transport officer gives the *Farmer and Stockbreeder* some interesting notes concerning the transport of horses by sea. Amongst other things he says:—Few readers are not aware of the bad effects of keeping horses idle and yet well fed in the stable, where a certain amount of movement is possible. On board ship this is aggravated by the monotony of being compelled to stand. "Monday morning" legs are only too well known among those who keep heavy horses, and big legs and water farcy are the subjects of not infrequent inquiry in the columns of this journal devoted to veterinary matters. All these troubles are multiplied aboard ship, as the blood in the limbs has always to ascend against gravity, without the compression afforded by muscular movements, to veins which have little or no impetus of their own. In addition, we have to deal with the lurching of the ship and the want of "sea legs," which is often not overcome until well on the voyage, many injuries occurring during the first day or two before a high-spirited animal becomes resigned to his narrow prison-house. He treads on the opposite coronets, strikes his fetlocks one against the other, runs back and galls his poll with the headstall, or gets down behind, and is in danger of breaking his neck, as his head is securely fastened. Of course the horses are watched by reliefs of competent men, who afford invaluable assistance, or the casualties would be infinitely greater.

It needs but little imagination to believe that horses prick up their ears when "land ahead" is shouted from above, but on once more feeling *terra firma* under their feet they are apt to feel it too much, by reason of founder or fever in the feet, congestion of the navicular joint, stiffness of the pasterns, and, indeed, of all the joints, more or less. In this condition—which is want of condition, to speak correctly—the impatient public are anxious that they should be pushed on to the front, carrying some valuable life into action, but too done up to carry it out again. Time is needed to bring back the proper circulation of the cramped limbs, to make the joint oil flow again, restore the wind and digestion; and this must be done by degrees. To ask too much of them the first day or two is to court fever in the feet.

Poultry.

THE MAKING OF CAPONS.

The converting of cockerels into capons is an operation which is attended with a certain amount of difficulty, and should never be undertaken by the inexperienced. The tools necessary for the operation are not many, consisting only of a very sharp curved knife, a curved surgical needle, and some waxed thread; and two persons are necessary for the successful accomplishment of the task. A reliable authority gives the following directions for the operation:—

The operator must sit down, the assistant holding the bird on his legs, with its back toward him and the right side downwards, the lowermost leg being held firmly along the body, and the left leg being drawn backwards toward the tail, so as to expose the left flank, where the incision must be made. A few feathers are plucked off just to expose the skin; the latter is raised up with the needle so as to avoid the intestines, and an incision large enough to admit the finger easily is made into the abdominal cavity, just at the posterior edge of the last rib; in fact, the knife is kept close to the edge of the bone as a guide. Should, by any mishap, any portion of the bowels protrude through the wound, they must be gently and at once returned. Supposing all well, the forefinger is then introduced and passed behind the intestines towards the spine, on each side of which the two testicles are situated, being in a young bird of four months of age, at which time the operation should be performed, rather larger than a horse bean. One of the testicles being felt, it must be gently torn by the finger away from its attachments to the spine, and removed through the wound, the other being afterwards sought for and taken away in a similar manner. Care must be taken that the testicle does not slip away among the intestines after it has become detached, as its detection then and removal from the body may prove difficult; but even if this accident should happen, not much beyond local inflammation will, as a rule, happen. Both testicles being safely removed, the edges of the wound must be brought together, and kept in the proper position by two or three stitches with the waxed thread. These must be made in the usual surgical fashion, each stitch being detached and tied separately, and not sewn as in a seam. In making them, the chief thing to guard against is to avoid even pricking the intestines with the needle, much less including any portion of them in the stitches, which would certainly result in the death of the bird. When all is finished properly there should be very little bleeding or suffering, and the bird should then be placed in a coop in a quiet place, and fed upon soft foods. After a few hours, he may be allowed in a run or yard by himself, but, until the wounds are thoroughly healed, he must not be allowed to perch, but compelled to sleep on straw. The soft food must be continued for three or four days, and, when quite well, the bird can either be fattened up for the market or utilised as a foster-mother for the rearing of chickens, for which purpose he comes in very handy after he has been caponised, especially for incubator-bred chicks.—*Farmer and Stockbreeder.*

THE PRESERVATION OF EGGS.

AT the instance of the Poultry Society of Saxony, an interesting competition has been held as regards the preservation of eggs. The eggs had to be handed in before 1st May, 1899, and were to be kept six months. As the main result of the competition it seems certain that preserving with water-glass is the best, the cheapest, and the most convenient method. The competition comprised two sections: the first for eggs intended for confectioners, general cooking purposes, &c.; and the second for well-kept, clean eggs, which should be readily saleable for ordinary purposes. Not one of the 150 competing eggs was rotten at the examination after the lapse of six months. In the first section there were three entries, and the eggs that were awarded first prize were treated in the following manner:—The eggs were first gently knocked against one another so as to ascertain that they had no cracks. From twenty-five to thirty eggs were then placed in a sieve and dripped with warm melted lard; when the eggs had been removed from the sieve and the lard coating had cooled, they were submerged in a solution of water-glass. For 600 eggs 6 lb. of water-glass dissolved in some 8 gallons of water were used. The cost of this method amounted to about two-thirds of a penny per score, and the taste of both the yolk and the white was irreproachable. There was no loss of weight. As regards the eggs awarded second prize, the yolk was good, but the white had become somewhat reddish. The taste, however, was all right. The eggs had been placed 5

minutes in a 20 per cent. solution of vitriol of iron, to which had been added 1½ per cent. tannin, soluble in water. The eggs were then rinsed with water, dried, and kept as might be ordinary eggs. The loss of weight was light, and the cost was about the same as in the previous case—two-thirds of a penny per twenty eggs. The third entry received no prize. The loss of weight was too great, and the yolk and the white had been shaken together. They had been kept in cowhair from a tanyard, and the basket in which the eggs were should be turned every six weeks.

This exhibitor also competed in the second section, but with the like result, as did several other competitors; some had used strong chemical solutions which had influenced the shell, or methods which necessitated looking after the eggs morning and evening. The first prize was awarded to Doctor of Medicine Braune, Dresden; the eggs sent in by this gentleman could not be distinguished from fresh eggs as regards outer and inner appearances, and the taste was very good. The eggs were washed with a brush and kept in an airtight box, which was filled with a 10 per cent. solution of water-glass which has been renewed once during the six months. There was no loss of weight, and the place where the eggs had been kept had been as warm as 20 degrees Réaumur. The first-prizetaker in the first section secured the second prize in the second section. The eggs were not so beautifully white as those of the first-prizewinner, but the inside of the eggs and the taste were irreproachable. The eggs had been fourteen days old when preservation began, and had been treated as those from the same competitor that took first prize in the first section, only they had not been dripped with lard, which reduced the cost to below ½d. per score. They had been kept in a cellar in which the temperature had not been above 8 degrees Réaumur. There was no loss of weight. Third and fourth prizes went to the same exhibitor. As regards the former, the eggs had an irreproachable appearance, and the inside was almost as good as Nos. 1 and 2. He had gradually dissolved ¾-lb. of water-glass in about a gallon of boiling water, and when cold poured the solution over the eggs, which stood on the narrow end in a stone jar. He had tied parchment paper over the jar, and kept it in a pantry where the temperature had been as much as 18 degrees Réaumur. The eggs had been eight to fourteen days old when the preserving commenced. The fourth-prize eggs were not quite so good as the former in taste; they had been kept in a solution of salt and lime. Neither Nos. 3 nor 4 had lost any weight.—*Mark Lane Express.*

YOUNG *V.* OLD FOWLS FOR LAYING.

F. E. Emery, of the North Carolina Experiment Station, at Raleigh, has just published a bulletin detailing the results of an elaborate test of fowls in feeding and laying. His carefully prepared tables show that for high production, weight of eggs produced, as well as for economy in production, pullets far outstrip hens.

The greatest production of eggs from pullets was made in this order: Light Brahma, Silver Laced Wyandotte, Black Langshan, Barred Plymouth Rock, and Single Comb Brown Leghorn. White Wyandotte, White Plymouth Rock, Black Minorca, and Buff Cochin are at the foot of this list.

Among the hens late hatched, Barred Plymouth Rocks leads, with Black Langshan and Brown Leghorn, followed by Barred Plymouth Rock and Buff Cochin, in this order. White Wyandotte and Light Brahma foot the list.

The greatest production of weight of eggs brings the birds in a little different order. Anong the pullets this order is: Light Brahma, Silver Laced Wyandotte, Black Langshan, Barred Plymouth Rock, White Wyandotte, and White Plymouth Rock, with Black Minorca, Leghorns, and Buff Cochin last.

In production of weight of eggs no hens were equal to the pullets of the same breed, except Brown Leghorn and Buff Cochin, and these were the poorest producers of weight of eggs.

Now, to change from numbers and weight of eggs produced to economy of production, a marked difference will be noted. This phase may be shown best

by percentage of value; market value for numbers, slightly varied by the time eggs were received, the January and June eggs having brought one-fourth of a cent each more than the other months; and intrinsic value as calculated from a standard weight and compared with cost of food for the breed.

	Per cent. of Market. Value of Eggs Produced above Cost of Food.	Per cent. of Value of Eggs. Produced by Weight above Cost of Food.
Pullets—		
Single Comb Brown Leghorn	182·8	198·2
Silver Laced Wyandotte	113·9	196·8
White Wyandotte	99·9	183·1
Black Langshan	75·6	155·8
Barred Plymouth Rock	45·5	109·4
Light Brahma	25·9	80·7
Black Minorca	20·7	94·9
White Plymouth Rock	20·9	75·8
Buff Cochin	3·4	49·9
Hens—		
Single Comb Brown Leghorn	80·8	140·2
Barred Plymouth Rock (late hatched) ...	63·8	130·6
Black Langshan	14·7	86 3
Buff Cochin	4·2	38·1
Barred Plymouth Rock	11·9	37·6
White Wyandotte	11·8	24·2

The leading breeds in this comparison are Brown Leghorn, Barred Plymouth Rock (counting the late hatch hens only), Black Langshan, and White Wyandotte. If Silver Laced Wyandotte were represented by mature fowls as good in proportion as the pullets, they would stand second best in rank in economy of production.

As far as this record goes it shows that for high production, weight of eggs produced, as well as for economy of production, pullets far outstrip hens.

POULTRY NOTES.

HATCHING GEESE.—The first eggs can be set under hens. Put a sod in the bottom of the nest and fill in with a little loose dirt, shape up a little, and cover an inch with short chaff. Five to eight eggs are enough for a hen. If it is desirable to make the goose lay a second litter, she can be confined away from the rest when she shows signs of wanting to set. In a few days she will start again usually. It takes about thirty days to hatch geese-eggs. Geese usually lay every other day; sometimes they lay at night and sometimes during the day. The pen should be moved to fresh grass every day. If possible sow some oats, wheat, or rye, and let them feed on that; they will do better so treated. For the first few days feed the goslings on chopped boiled eggs mixed with stale bread, and finely chopped grass or cabbage. Nettles, if procurable, make the best of green food; they seem to be peculiarly adapted to young goslings; they should be chopped up fine. After the fourth day feed the same as ducks. A mash of vegetables, bran, cornmeal and grass, or anything green, makes a good feed. They should be fed four or five times a day.

Always have separate houses for ducks and geese. Keep the floor well littered with straw or leaves, and do not let it become filthy. They must have clean quarters to sleep in, especially during cold weather. During mild or

warm weather they may be allowed to sleep anywhere they choose out of doors, except during the laying period, and then they should be guarded so as to get the eggs.

Gapes in Chickens.—Gapes in chickens are the result of worms in the windpipe. Generally there is little difficulty in getting rid of them. A very simple way is to wind a small piece of slightly rough silk or satin round the end of a goose's quill, securing it at the upper end with a silken thread. Now, if this is inserted into the chicken's windpipe (the neck of the bird being held out straight), a single turn will bring the worms with it, and the cure is effected. A little camphor in the drinking water should be afterwards supplied.

Best Food for Fowls.—Wheat is the best grain to give fowls for every day food. Corn (maize) is too fattening, and should only be fed to those intended for the table.

Scours.—Scours is a species of diarrhœa; the vent becomes clogged, and in bad cases complete stoppage ensues, the discharge hardening and blocking the passage. Taken in time, the chicks will recover, but they lose flesh, and never regain the check to their growth. In many cases they die. The cause of scours is generally attributed to a surfeit of water, as chicks will drink too much in hot weather. Artificially hatched chickens suffer most from scours. It used to be a common belief that scours could be prevented by giving chickens no drinking water at all, allowing them to get all needful moisture from moistened food, and from the grass before the dew is off.

Hatching Ducks.—Common hens are generally used for hatching ducks by those who have no incubators. For this purpose Brahmas or Cochins are to be preferred, as they are incubators by nature, cover a large number of eggs, and on duck-eggs their weight and clumsiness is not so apt to result in breakage. Ducks begin laying very early in the season, and consequently it is necessary to have winter-laying hens to do the sitting. The breeds mentioned above, and others besides, are the ones to depend upon for this peculiarity. The nests should be just such as are made for large hens when brooding their own eggs. The boxes should not be less than 16 inches square and filled in to the depth of 1 or 2 inches with fresh sandy earth. When this is shaped by filling in the corners of the box so that the nest shall be merely level on the bottom, and covered with 1 inch of soft chaff, you have a perfect nest. Leave the rest to the hen.

Young ducks should be killed at ten weeks old or less, before the pin feathers start. The birds are then far less tedious to pluck, besides which the flesh is not so good. Ducks and fowls should not be fed for at least twenty-four hours before killing.

Things to be Remembered.

Most of the little chicks which die are carried off because of exposure to cold and damp. Let there be no draughts about them in the coop, but ventilate from above. Keep them out of the rains, and so arrange their drinking troughs that they will not get in them. See that they are free from lice. Without this care you will receive neither pleasure nor profit.

There is no single mistake, in the care of poultry, so common as that of overfeeding. Gorging with foods that make fat is not the way toward profitable egg-production. When fowls are confined so that they do not get much exercise, this is to be guarded against.

Eggs keep better when cocks do not run with the hens.

As a rule it pays better to sell eggs than raise chickens for the market.

A small flock well cared for will make more money than a large one neglected.

Old hens don't lay; kill them, or they will eat out the profit of those which do.

To secure the best results chickens and old fowls should not be allowed to run together or to be fed together. It may not be worth while for one who keeps a small number of fowls to go to the trouble of keeping them separate, but the facts remains that the best results are only obtained by so doing.

The following is from the *American Agriculturist*:—Chickens ten weeks old will weigh 1lb. dressed, and the last of February or first of March will be worth from 50 to 75 cents (2s. to 3s. 1d.) per lb. As a hen rarely cares to sit in the fall, an incubator must be used if one cares to raise broilers for market.

The Orchard.

DRYING FIGS.

Do not gather until all growth has positively ceased and the fruit hangs with a cracked, withered, and shrunk skin. A slight sulphuring is necessary to prevent staining matter passing into the skin.

Place the fruit—eye upwards—on lattice trays, and sulphur at the rate of 6 oz. per square yard for 30 or 40 minutes, according to the size of the fruit. Place the trays in the sun on such material as will reflect the greatest heat. A variable temperature to, say, 40 degrees usually produces sourness, hence the necessity for keeping the fruit warm during the night.

The covering should be of boards or close canvas, strained tent-like over the drying floors. In no case should rain or dew fall on the fruit.

It is rarely possible to lift the fruit bodily. It requires going over day by day to remove the dried ones. They should always be lifted warm to prevent sourness.

When the whole parcel has been collected into a box, leave them for three or four days to cool; then carefully search for sour specimens. Class them at the same time. Now, with the boxes and fruit ready for packing, prepare a solution of salt and water (1 lb. salt to 2 gallons water) at a temperature of about 140 degrees Fahr. The fruit requires to be immersed in this solution, shaped, pressed, and fed into the box as directly as possible. It must be the aim of the packer to make the skin flexible, and hide any harsh patches by packing the fruit evenly, neatly, and firmly.

Sulphuring Chamber.—A bottomless cabinet 5 or 6 feet high, of a width equal to the length of the tray, and depth a little more than the width of the tray. Place ½-lb. of sulphur in a pan beneath the tray; ignite with a hot coal; burn without much fire to avoid too great heat. The above quantity will be sufficient to sulphur 40 lb. of fruit in about 40 minutes.

Note.—Dipping in lye is exploded, as it toughens the skin.

It is a good plan to slit the fruit lengthwise with a sharp knife on the under side (into the eye only, not right through) to facilitate even drying. If this be not done, the fruit may look perfectly cured on the outside, and yet be fermenting in the centre.

White Genoa and White Marseilles are the best figs for drying purposes.

Plate CLXXXVII.

DIPODIUM PANDANUM. *Bail.*

Plate CLXXXVIII.

DIPODIUM PANDANUM, *Bail.*
(Natural Size.)

Botany.

CONTRIBUTIONS TO THE FLORA OF NEW GUINEA.

By F. MANSON BAILEY, F.L.S.
Colonial Botanist.

Order RUTACEÆ.

MELICOPE, Forst.

M. Mahonyi, *Bail.* (n. sp.). (After John Mahony.) A slender, straggling shrub. Branchlets flattened at the upper nodes, then bluntly 4-angled, soon becoming terete. Leaves 1-foliolate; leaflet oblong-lanceolate, often slightly falcate, about 5 in. long, 1¾ in. broad; sessile upon a petiole of about 1 in.; membranous, lateral nerves slender and distant, the apex bluntly acuminate. Flowers white, minute, in very dense short axillary cymes scarcely exceeding the petioles. Pedicels about 1 line long. Sepals 4, very minute; petals 4, about 1 line long, ovate and at length reflexed upon the pedicel, tips inflexed. Stamens 8. Filaments flattened, about as long as the petals, margins ciliate. Anthers rather large. Cocci 4 or less by abortion, globular, 1 line diameter. Seeds black and shining.

Hab.: Sudest, *John Mahony.*

Order ORCHIDEÆ.

DIPODIUM, R. Br.

D. pandanum, Bail. (n. sp.) (Growth of plant resembling a *Pandanus.*) (Plates CLXXXVII. and CLXXXVIII.) Stems 2 or more feet long, adhering to tree trunks like some kinds of *Pandanus* or *Freycinetia*, often exceeding 1 in. in diameter, somewhat compressed, the internodes of the lower naked portion of the stems seldom much exceeding ½-in. long. Leaves distichous, very close together, 1 to 2 ft. long, sessile and tapering from 2½ in. broad to an acute apex; longitudinal nerves very prominent, 2 to 3 on either side of midrib, often with a strong transverse nerve below the middle of the leaf. Raceme with the peduncle about 1¼ ft. long. Flowers about 12. Bracts of peduncle 2 or 3, distant, larger than those subtending the flowers, ovate acuminate, about 2½ lines long, glabrous, green. Pedicel with ovary about 16 lines long, slender, white. Sepals about 1 in. long, 4 lines broad, oblong, bluntly acuminate, with deep-red blotches on the back, faintly showing on the face of each segment. Petals like the sepals, but smaller. Labellum erect, about 8 lines long, 3-lobed, the lateral ones reduced to small white teeth, one on either side of and embracing the base of the column; the basal spur short and broad, the sides of the middle lobe flatly folded back from the centre and nearly against each other; disk plates 3, rosy purple, their margins densely covered with flat white glands, giving a velvety appearance to the face of the lobe. Column short, thick, white at the base, the upper portion yellow. Anther-lid small. Pollen masses oval, light coloured.

Hab.: Near Samarai, *W. E. Armit.* The accompanying illustration is from a plant I brought from New Guinea in 1898, and now (March) flowering in the Botanic Gardens, Brisbane.
The nearest ally of the present species is *D. paludosum*, Reichb. f., of India.

Popular Botany.

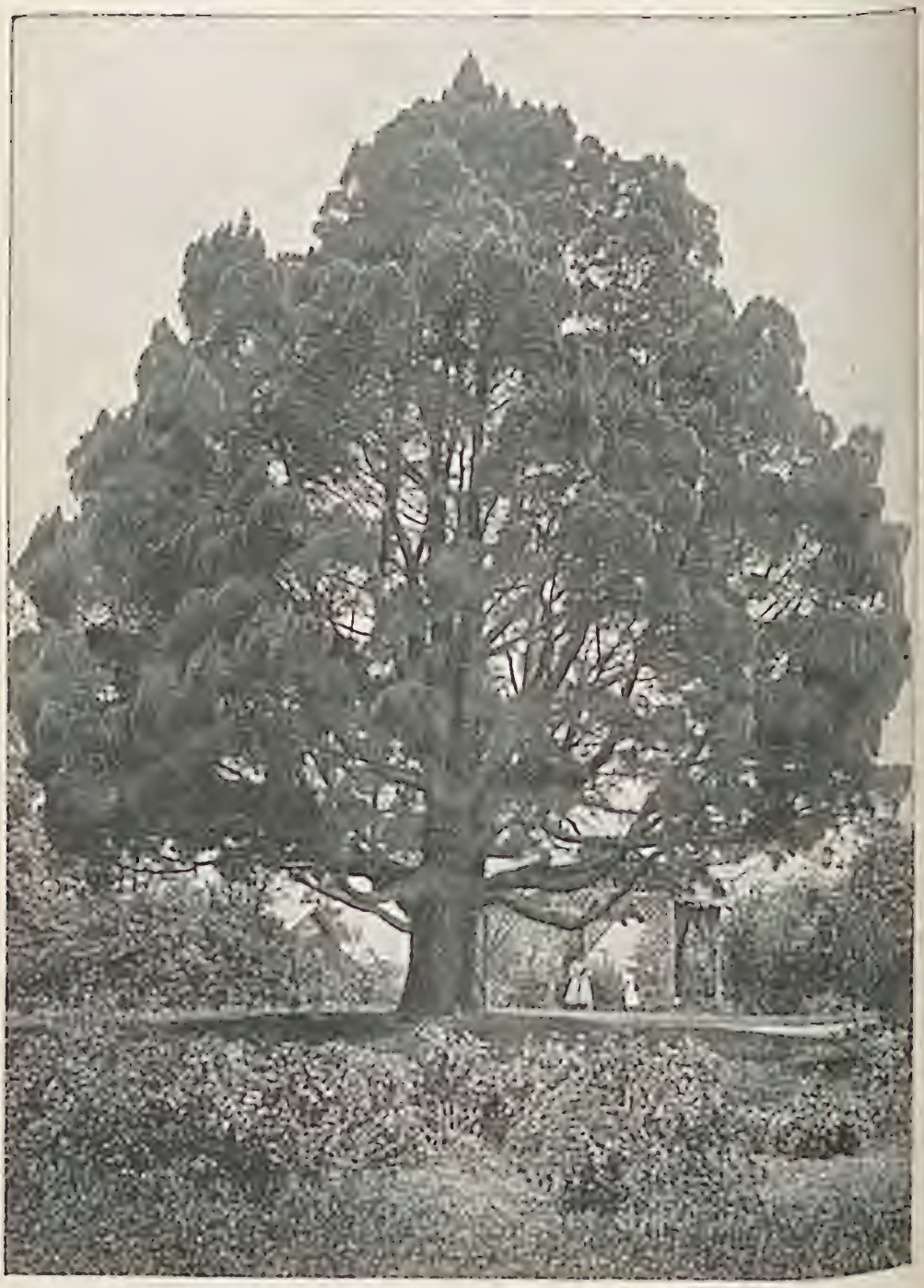
OUR BOTANIC GARDENS.—No. 11.

By PHILIP MAC MAHON,
Curator, Botanic Gardens, Brisbane.

ONE of the objects of the Botanic Gardens is to introduce, test, and acclimatise the plants of other countries, and to propagate them for dissemination to public institutions and to such persons as may be willing to assist in the very necessary work of collecting the native flora, a representative collection of which should be in these Gardens. The want of the collector, always attached to botanic gardens, renders us dependent upon outside courtesy in this direction. The plants of which a précis follows are mostly timber trees. Some are natives of the colony, many of other colonies of the Australasian group, and the descriptions are easy of reference, and, though brief, of great interest for those interested in the subject of reafforesting and planting for shade and ornament. All the seeds are now available here on an exchange basis.

1. Acacia acinacea (a Wattle).
2. Acacia Baileyana (Bailey's Wattle). A very beautiful ornamental small tree.
3. „ binervata (Black Wattle, Hickory). Ornamental; timber tough, light, tool handles, &c.
4. Acacia Cunninghamii (Black Wattle). Timber heavy, cabinet-work; bark for tanning.
5. Acacia Oswaldi (Oswald's Wattle). Timber, hard, small; bark, 9·72 per cent. tannic acid.
6. Acacia pendula (Weeping Myall). Stock fond of leaves; timber, "violet wood," pipes, boxes, &c.
7. Acacia penninervis (Blackwood, Hickory). Bark, 17·9 per cent. tannic acid.
8. „ podalyriæfolia (Silver Wattle). Bark gives leather light colour, 12·40 per cent. tannin.
9. Acacia pycnantha (Golden Wattle). One of the richest tan barks in the world (Maiden); 33·5 per cent. tannin in bark, 15·16 per cent. tannic acid in leaves; timber tough, sp. gr. ·83 = 51½ lb. per cubic foot.
10. Acer platanoides (Norway Maple). Fine tree, dense and tall; wants cool position, deep soil; wood pale, cabinet-work, &c.
11. Albizzia Lebbek (Lebbek Tree, Siris). Very beautiful shade tree; wood, 40 to 60 lb. cubic foot.
12. Albizzia moluccana. Ornamental.
13. Allamanda neriifolia. Shrub; yellow flowers.
14. Alphitonia excelsa (Red Ash). Wood hard, durable, takes high polish.
15. Andropogon sericeus (Blue Grass). Best of all native grasses (Bailey); beloved of all herbivorous animals (Maiden).
16. Antidesma Dallachyanum (Herbert River Cherry). Fruit makes preserve like red currants.
17. Areca sapida. Ornamental palm.
17. Aristolochia elegans (Dutchman's Pipe). Beautiful creeper.
18. Araucaria Rulei (Rule's Bunya). An ornamental tree of New Caledonia.
19. Aralia papyrifera (Chinese Paper Plant). Chinese "rice" paper made from this plant.
20. Atalantia buxifolia. A hedge plant.
21. Barklya syringifolia. Beautiful native tree; yellow flowers.
22. Bauhinia alba. Ornamental tree.
23. Bauhinia Hookeri (Queensland Ebony). Timber heavy, elastic, dark-red; cabinet-work; flowers, white; a most graceful and lovely tree.
24. Bignonia Tweediana (Trumpet Flower). Handsome climber; yellow flowers.
25. Bixa Orellana (Anatto shrub). Dye used in colouring cheese, from pulp of fruit.
26. Buckinghamia celsissima. Ornamental native tree; white flowers.

Plate CLXXXIX.



CYPRESS PINE (CALLITRIS ROBUSTA, *R. Br.*)

27. Calliandra pulcherrima (Tassel Flower). A red flowering shrub; very ornamental.

28. Carya sulcata (Furrowed Hickory). Wood heavy, strong, elastic, durable.

29. Cassia fistula (Indian Laburnum). Most ornamental; used dyeing and tanning in India.

30. „ odoratissima. Ornamental tree.

31. „ pistaceæfolia. Yellow flowered; ornamental tree.

32. Casuarina glauca (Bull Oak). Leaves eaten by camels; wood red, beautifully marked.

33. Casuarina tuberosa (Erect She Oak, Forest Oak). Valuable fodder in drought; timber of great beauty; tool handles, mauls, bullock yokes, shingles, &c.

34. Cedrela Toona (Red Cedar). Very valuable tree; fine timber, 35 lb. to cubic foot; used in India as forage, medicine, gum, dye, tan, and timber.

35. Chrysophyllum olivœforme. A West Indian tree, pretty foliage.

36. Cocos plumosa (Feather Palm). Most graceful, tall, rapid growing, should be extensively planted for ornament, grows well on a clay subsoil and indeed on most soils.

37. Coix lachryma (Job's Tears). A curious grass.

38. Cotoneaster microphylla. Low shrub, good to cover rocks.

39. Cryptocarya australis (Moreton Bay Laurel). Timber light, durable if dry. Insects avoid it.

40. Cupressus Lawsoniana (Lawson's Cypress). Timber valuable, fragrant, easy to work, free from knots, elastic, durable; 80 to 150 feet.

41. Cupressus lusitanica (Cedar of Goa). Small ornamental tree.

42. „ sempervirens (Common Cypress). Timber insect proof; very durable. Doors of St. Paul's, Rome, have lasted 600 years, made of this; used for musical instruments, trunks, boxes, &c., &c.

43. Cupressus sempervirens, var. stricta.

44. Desmodium gyrans (Telegraph Plant). Notable for the curious movements of its stipules.

45. Desmodium tortuosum.

46. Diploglottis Cunninghamii (Queensland Tamarind). The seed has a covering or "aril" of a delicious acid taste. Timber recommended for cabinet-work; 38 to 50 lb. a cubic foot.

47. Diptotherium maritimum (Brazilian Coast Palm). Fruit useful. Highly ornamental and stately palm.

48. Dombeya mollis (Soft-leaved Dombeya). Ornamental shrub.

49. Duranta Ellisii (Hedge Plant). A white variety of Duranta (the common hedge plant).

50. Erythrina Christi-galli (Christ-Thorn). Handsome-flowered shrub.

51. Erythroxyton coca (Coca Plant). Used in South America as a stimulant; the source of cocaine.

52. Eucalyptus acmenioides (Stringy-bark). Timber heavy, durable, strong; 67½ lb. to cubic foot. Flooring boards, slabs, rails, palings, &c.

53. Eucalyptus amygdalina (Peppermint). Tallest tree on earth; reported 471 feet high. Timber useful in railway carriage work, &c.

54. Eucalyptus calophylla (Red Gum, W.A). Timber most useful for all sorts of building, wheelwright's work, ploughs, shafts, rails, &c.

55. Eucalyptus capitellata (Stringy-bark, Sydney). Timber tough, strong, durable, fissile; posts, rails, carpentery, good fuel; yields oil.

56. Eucalyptus corymbosa (Bloodwood). Timber durable when used whole. Posts, &c.; difficult to burn; red gum kino very abundant.

57. Eucalyptus corynocalyx (Sugar Gum). Timber heavy, termite-resisting; does not warp; fencing, sleepers, piles, planking, naves, felloes, rafters, &c. Resists drought (F. v. M.)

58. Eucalyptus crebra (Ironbark). Timber strong, tough, excellent; piles, bridges, railway ties, and many other uses.

59. Eucalyptus diversicolor (Karri, W.A.) Timber straight-grained, tough; large planks, rails, spokes, felloes, ship's planks. Said to cover 2,300 square miles in Western Australia.

60. Eucalyptus eugenioides (White Stringybark). Inferior fuel, splits well. Shingles, palings, slabs, &c.

61. Eucalyptus fibrosa. Probably synonymous with E. siderophloia (*q.v.*)

62. „ globulus (Blue Gum of Tasmania). Timber pale, hard, heavy, durable. All kinds of purposes. Trees useful for absorption of moisture in unhealthy localities; yields 12½ oz. oil to 100 lb. leaves.

63. Eucalyptus goniocalxy (Grey Gum, White Gum, &c.) Timber hard, tough, workable. Ships' boats, sleepers, spokes, general purposes; good fuel.

64. Eucalyptus hæmastoma (Scribbly Gum). Timber fair for rough work; fair fuel. Bark yielded 11·27 per cent. of tannic acid.

65. Eucalyptus hemiphloia (Gum-topped Box). Timber often piped, tough, strong, grain interlocked, non-fissile; makes best treenails, makes piles, sleepers, scantlings, slabs, posts, naves, felloes, handles mauls. Found on good grazing country.

66. Eucalyptus leucoxylon (Yellow-wood). Timber very good; great lateral strength; used for all kinds of work; said to indicate gold-bearing country; yields oil, wood spirit, tar, good charcoal. Bark, 21·94 per cent. tannic acid.

67. Eucalyptus maculata (Spotted Gum). Timber very pliable, splits well, hard, durable. Shafts, wheels, house carpentry, &c.

68. Eucalyptus maculata, var. citriodora (Lemon Scented Gum). Leaves give a delightful scent. Used to preserve clothes in boxes, &c., from silver-fish and cockroaches; fragrant oil distilled from leaves.

69. Eucalyptus marginata (Jarrah, W.A.). A celebrated timber, covering over 10,000 square miles; used for heavy work, piles, building, planking, &c.; termite and toredo proof; uninflammable; 100 to 150 feet high; 10 to 11 feet in diameter.

70. Eucalyptus melanophloia (Silver Leaved Ironbark). Small tree with close-grained hard timber.

71. Eucalyptus melliodora (Yellow Box). Timber hard, durable, tough; hard to work or split; spokes, rollers, framework, naves, cogs, treenails.

72. Eucalyptus microcorys (Tallow-wood). Timber strong, durable, greasy; naves, spokes, flooring ball-rooms. Oil, 375 oz. from 1 ton fresh leaves.

73. Eucalyptus paniculata (She Ironbark). Timber very durable, bears great strain; posts, bridges, sleepers, carriages, beams; very workable.

74. Eucalyptus pilularis (Blackbutt). Timber bears great crushing strain; bridge planks, decks, paving blocks, telegraph poles, sleepers, bent work; 61 lb. 14 oz. to cubic foot.

75. Eucalyptus piperata (White Stringybark). Timber durable, even in damp soil; posts, shingles, buildings, &c.; specific gravity ·922.

76. Eucalyptus Planchoniana. Timber grey, hard, heavy; non-fissile; used for building, &c.; gum-kino medicinal.

77. Eucalyptus populifolia (Poplar-leaved Box). Timber hard, heavy, close-grained, durable, takes high polish; posts, building, sleepers, mauls; half the wood is unsound.

78. Eucalyptus redunca (White Gum, W.A.) Timber pale, hard, very tough, durable; valuable for building, tools, shafts, cogs, naves, spokes, felloes, &c.; 70 lb. to cubic foot.

79. Eucalyptus resinifera (Jimmy Low). Timber strong, durable, cobra-resisting, non-shrinking; ship's knees, shingles, posts.

80. Eucalyptus robusta (Swamp Mahogany). Timber red, not strong, brittle, non-fissile, free from insects on account of red kino 19 per cent.; building, shingles, fuel; leaves have been used in tanning.

81. Eucalyptes rostrata (Stanthorpe Yellow Jacket). Timber strong, durable, very hard when dry; second only to Jarrah for resisting toredo and termites; bridges, wharves, sleepers, posts in damp ground, &c.; kino, medicinal; oil agreeable, 1 oz. to 100 lb. leaves.

82. Eucalyptus saligna (Blue Gum, Grey Gum, &c.) Timber used for fencing and building.

83. Eucalyptus siderophloia (Ironbark). Timber very valuable; bright colour; very hard, strong, rigid, difficult to work; gives timbers 20 to 40 feet long, 11 to 18 inches square; used in engineering and shipbuilding in colonies for beams, kelsons, &c., and in the English mercantile navy; 70 to 100 feet high, 20 to 50 inches diameter.

84. Eucalyptus Sieberiana (Cabbage Gum). Timber easily workable; not held in very high esteem.

85. Eucalyptus Stuartiana (Stanthorpe Box). Timber hard; durable, non-inflammable, non-fissile, polishes well; sleepers, posts, &c. Does well in India.

86. Eucalyptus tereticornis (Blue Gum, Grey Gum, Slaty Gum). Timber red; close-grained, tough, durable; fencing, building, shipbuilding, cartwright's work; good fuel.

87. Eucalyptus trachyphloia (White Bloodwood). Timber grey; heavy, hard, strong, tough, durable.

88. Excæcaria sebifera (Chinese Tallow Tree). Pulp around seeds makes tallow; leaves, black dye; seeds oil.

89. Ficus Cunninghamii (Cunningham's Fig). Good shade tree, surface rooter.
90. Ficus macrophylla (Moreton Bay Fig). Wood 34 lb. to cubic foot; soft, good shade tree, surface rooter.
91. Ficus religiosa (Peepul Tree). Ornamental tree; used in India as timber, leaves for fodder, &c.
92. Fraxinus excelsior (English Ash). Timber valuable; cool districts only.
93. Frenella robusta (Cypress Pine). Wood fragrant, brown, durable, takes high polish, resists white ant and cobra, full of knots which are ornamental, shrinks and warps little; piles, boat sheathing, furniture, lining, &c.; 60 to 70 feet high, 18 to 24 inches diameter.
94. Gardenia florida (Gardenia). Sweet-scented flowering shrub.
95. Gleditschia triacanthos (Honey Locust). Tree.
96. Gossypium hirsutum (Upland Cotton). Shrub.
96A. Hæmatoxylon campechianum (Logwood Tree). Tree; 40 feet, wood for dyes and inks, also in medicine.
97. Hibiscus tiliaceus (Cotton Tree). Good seaside tree; natives use roots for food and fibre for nets, &c.
98. Hibiscus schizopetalus. Beautiful shrub with remarkable flowers.
99. Hymenœa Courbaril (West Indian Locust Tree). Large tree; three times stronger than British oak, and four times more elastic; probably grow well in North Queensland; fragrant resin exudes from trunk; known as West Indian copal.
100. Ilex paraguensis (Maté Plant). Small, dense tree; from the leaves the maté tea is prepared.
101. Lafoensia punicæfolia. Tree with curious flowers.
102. Lagerstrœmia flos-reginea (Jarool Tree). Timber valuable; 37 to 48 lb. to cubic foot.
103. Lagerstrœmia indica (Telinga-China). Ornamental shrub.
104. Ligustrum lucidum. Ornamental and hedge plant.
105. „ pubescens. Ornamental and hedge plant.
106. Liquid amber styraciflua (Sweet Gum Tree). Timber valuable; reddish-brown; heavy, fine-grained, durable, easily worked; makes good furniture; a noble tree; should be tried on the Downs.
107. Macadamia ternifolia (Queensland Nut Tree). Valuable good nut; much relished by whites and natives; timber firm, fine-grained, reddish; takes good polish; good for furniture.
108. Melia composita (Bitter Bark, Cape Lilac). Handsome spreading tree, lilac flowers; liable in Queensland to attack by caterpillars.
109. Melia sempervirens. Tree.
110. Melianthus major (Honey Flower). Ornamental foliage plant, 6 feet high.
111. Melilotus leucantha. Fodder and bee plant.
112. Mimosa pudica (Sensitive Plant). A naturalised South American plant, likely to become a pest in tropics. Seeds will not be distributed in Queensland.
113. Murraya exotica (Indian Satin Wood). Handsome flowering shrub, delicious scent. Wood 62 lb. to cubic foot; suggested for wood engraving.
114. Myrospermum Pereiræ (Balsam of Peru). Handsome tree; medicinal.
115. Nerium oleander (Oleander). Flowering shrub.
116. Onobrychis sativa (Sainfoin). Good fodder plant, deep rooting; marly soil; dry localities; more nutritious than red clover or lucerne; good bee plant.
117. Panax elegans (Whitewood Tree). Ornamental; 30 to 40 feet.
118. Panicum crus-galli (Barn Yard Grass). Strong, succulent, shooting well; green fodder or hay; common in Queensland.
119. Panicum maximum (Guinea Grass). Rich nutritious fodder; luxuriant growth; prefers damp, good soil.
120. Panicum teneriffæ v. rosea (Red Natal Grass). Splendid for stock; seeds freely, spreads quickly.
121. Pereskia Bleo. A shrubby cactus; used for grafting others on.
122. Pittosporum eugenioides (Tarata, New Zealand).
123. „ undulatum (Native Laurel). Splendid breakwind; timber hard, close-grained; suggested for wood engraving; flowers scented.
124. Platanus orientalis (Eastern Plane). Shade tree for cool districts.
125. Poinciana regia (Royal Peacock Flower). Most handsome umbrella-like tree; beautiful flower, produced abundantly.
126. Pseudotsuga Douglasii (Douglas Pine). Valuable timber, magnificent tree; cool districts.
127. Ptychosperma elegans (Bangalow Palm.) Leaves made into water-buckets by natives; a very ornamental and free growing palm.

128. Quisqualis indica (Rangoon Creeper). Beautiful climber, flowers varying from rose to white; scented like vervain.
129. Rhapphiolepis indica (Indian Hawthorn). An ornamental flowering shrub.
130. Ricinus communis (Castor Oil Plant). Oil extracted from seeds; a large industry in India.
131. Rumex hymenosepalus (Canaigré). Valuable tanning plant; dry root yields 23½ per cent. rheo-tannic acid; foliage has been used as a vegetable.
132. Sambucus nigra (English Elder). Shrub.
133. Schotia latifolia (Boerboom Tree). Small tree.
134. „ speciosa. Roasted pod eaten in Africa.
135. Sesbania aculeata ("Nardoo" of Norman River). Used as food (seeds) and fishing nets (fibre) by blacks.
136. Solanum giganteum. Foliage plant.
137. Sophora tetraptera ("Kowhai," "Pelu"). Small tree; timber exceedingly hard.
138. Spondias pleigyna (Burdekin Plum). Timber like American walnut, hard, splits straight; cabinet-work, joinery, turnery.
139. Stenocarpus salignus (Beefwood). Timber beautiful, getting scarce, red, hard, close-grained, well marked; 44 lb. to cubic foot; furniture, picture frames, walking-sticks, makes fine cooper's work.
140. Sterculia acerifolia (Flame Tree). Timber light, 27¼ lb. to cubic foot; fibre like lace tow, elastic, good to stuff pillows, &c.
141. Sterculia diversifolia (Kurrajong). Blacks use roots as food; seeds edible; cattle and sheep eat leaves and branches, and have lived on them in drought time for long periods.
142. Strychnos nux-vomica (Strychnine Tree). Seed poisonous; pulp of fruit harmless.
143. Tecoma stans. A yellow flowered shrub.
144. Terminalia arjuna (Arjun Tree). Handsome tree.
145. Thuya Lobbii (Arbor Vitæ). Coniferous shrub.
146. „ orientalis, var. pendula (Weeping Arbor Vitæ). Coniferous shrub.
147. Trachycarpus excelsus (Japanese Fibre Palm). Handsome palm; fibre used for rope-making
148. Tristania conferta (Brisbane Box). Timber strong, durable, works well, resists termites, polishes, pretty grain, must be well seasoned; shipbuilding, ribs of vessels, &c.
149. Vangueria edulis. Small tree; fruit edible.

Apiculture.

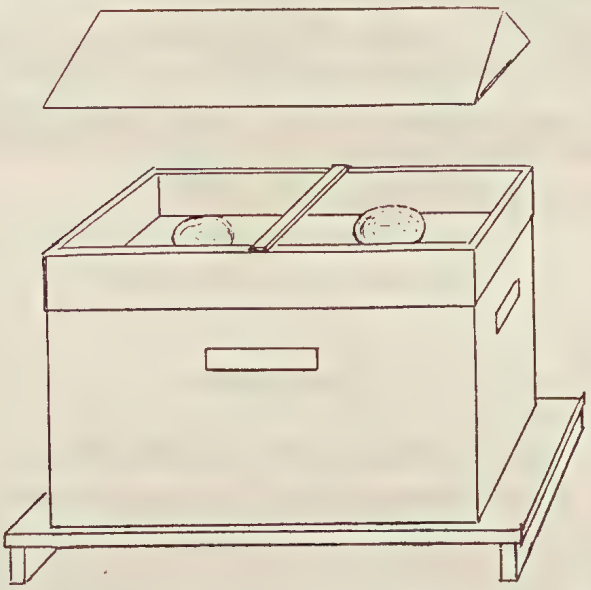
BEE NOTES FOR THE MONTH.

By H. R. STEPHENS, Busy Bee Apiary, Toowoomba.

As the cooler weather is approaching, bee-keepers should be gradually working off the supers. This direction applies more especially to those parts of the colony where the winter sets in early, as honey left in the hives too late in the autumn will be found very difficult to extract cleanly, and with some qualities, which otherwise are the very best honey, the job of getting it out of the combs, even when the extractor is turned patiently and carefully, is in the end unsatisfactory. I would therefore advise all honey being extracted before it is affected by the change of temperature. As regards comb honey supers, it is a good plan to invert the super when the sections are partly filled, as bees have a tendency to attach the comb to the upper part of the section or frame in preference to the lower, and by inverting we secure fuller and more completely filled sections. The bloodwood is in flower in Toowoomba this month, and bees must get large quantities of nectar from it, as a well-grown tree bears an immense quantity of blossoms, though I am not aware of the quality and colour of the honey.

Another consideration to bee-men at this time of the year is that some colonies may throw off late swarms, and there is no doubt that it is the early swarms that are most profitable. I mean those that come out before the New Year, as the later ones that delay their swarming till February and March are generally occupied when hived in rearing brood and getting strong for the winter, and, again, as the better part of the honey season is over before the swarm issues, there is no surplus stored, and the bee-man has the risk of getting them through the winter and strong in spring before they give any return; therefore I would advise uniting late swarms, unless they are very strong and able to look after themselves.

Another precaution that will have to be taken shortly is to prevent the bees starting robbing, by having the hives all bee-tight, and, in the case of weaker colonies, reducing the size of the entrance and not feeding bees near their hives, for if you are careless in these matters there will be war between your stocks, and, unlike the present Boer *v.* Briton contest, the bee casualty lists contain only the number of those killed for in a case of honey-robbing the bee gives no quarter and has no First Offenders Probation Act. Therefore, if you want things to go smoothly in the apiary, prevent all petty larceny, and, if it be necessary to feed your bees in a time of scarcity, give the honey or syrup inside the hives or at a considerable distance away from them. The plan I use and prefer is to place a narrow frame about 2 inches wide, and of the same dimensions as a hive body, on top of the hive to be fed, and put a plate of syrup or honey on top of the frames of comb. Then put on the mat and cover, and everything is quite secure from strange bees, and in a few hours the food will be taken down. A bar is nailed across the centre of the feeder to support the mat.



MOVING HIVES.

Bees (says an exchange) will fly for their stores a mile or two, and in times of scarcity five miles may be reckoned as within the limits of their pasturage. After a bee has fixed his locality he starts out in the morning and never stops to take the points. If you have moved his hive about a yard or so he will find it out; but if you have moved it a mile, half-a-mile, or quarter of a mile, all of a sudden, he will never find it out, as he invariably returns to his old locality. On reaching there and finding his hive gone he is lost and helpless, and will never find it again. Some people imagine that they can remove their hives anywhere

and everywhere, and new hands move their hives together at the approach of winter that they may the better protect them with straw. All goes very well until we have a fine warm day. Then the bees start out for a fly, and return to their hives just as they have been doing all the summer. They fly about, get into the wrong hives, get stung, the whole apiary becomes mixed up, and a general *melée* ensues. Moving hives during the working season will cause a loss of more or less bees as well as honey. Natural swarms should remain where put up, as they depend very much on the surrounding objects in taking their points. Several hives can be moved successfully if we maintain their position in the apiary, and carefully preserve their respective positions with reference to each other. Where the new position is outside the radius of flight, say about two miles, they can be moved at any time. If bees are sent long distances, they must be furnished with old, tough combs, otherwise no combs at all, as newly-made combs will surely break down in transit, and combs and bees at the end of the journey will be found to consist of a smothered mass of moving insects that survive but a few hours after arrival.

Tropical Industries.

FINE CIGAR TOBACCOS.

By R. S. NEVILL,
Instructor in Tobacco Culture.

THE revolution that has been going on in tobacco-growing in the United States, has finally resulted in the covered field for cigar tobaccos, illustrations of which are here shown. The object of this covering is to secure a larger per cent. of wrapper leaf. It was suggested by observing the plants that grew in the shade of the trees that had been left in the field; such plants were noticed to be lighter in body, smoother, and showing, when cured, the fine satin finish so much desired in cigar wrappers. Since the introduction of Sumatra wrappers to the trade in 1864, the demand for superior quality—not quantity—has been increasing; and as this demand was best supplied from Sumatra, the effort to produce a like wrapper has been constant, until now, in the shaded field, it is believed to have been accomplished, and, notwithstanding the heavy cost of these coverings, it is stated the results are satisfactory. Although the prices paid for these tobaccos seem high—from 2s. to 8s. 4d.—yet, when we take into consideration that one pound of it will wrap about three and a-half times as many cigars as other tobaccos, besides making a more uniform and merchantable article, it thus proves the cheaper to the manufacturer. One difficulty with the growers is, they want quantity, and it seems hard for many of them to realise that the soil that produces the greatest quantity of a given product is not always the best for that product, but this is certainly true of tobacco, as a rule; and we here have a practical demonstration that, notwithstanding the high cost of production, it is more profitable than to produce large quantities of inferior tobacco.

These coverings are not used in Sumatra, because they are not needed, nor do I believe they will be needed in Queensland, as I think we have the natural conditions for growing a superior wrapper, but they serve to show the value of producing the very best.

Plate CXC.

—The Outside of a Grease Tobacco Field Covered with Cheese Cloth.

Part of a Grease Tobacco Field covered with Cheese Cloth, showing the Details of the Outside Structure of the Frame.

Sumatra Tobacco under Cheese Cloth on June 25, just after the Plants had been Topped.

TOBACCO FIELDS COVERED.

HOW TO HARVEST RICE.

D. D. McLean, writing to the *Braidentown News* about harvesting rice, has the following to say :—

According to agreement, I drop you a few lines on rice culture in Florida, or rather on harvesting Florida rice. As the methods of cultivation vary according to the varied soils, each planter must depend on his own experience for the best method of cultivation. I would say, however, that old settlers here have told me that rice would not make on marl hammock land.

As to harvesting, our method is to begin cutting as soon as the head fibres have turned brown and half-way down to the head, about what an inexperienced person would call half-ripe, as the loss is much greater every way on over-ripe rice. The grain seems to be softer and the hull adheres more closely to the grain, besides the loss in shattering and straw falling. Begin cutting as soon as the dew is off, and as soon as the straw is fairly wilted let the binding and threshing begin. Bind in very small bundles ; never leave your rice to dry on the sheaf. Shock the straw out to cure after it is threshed ; spread it out thin on the tight floor as soon as threshed to dry ; stir frequently to prevent its going into sweat ; as soon as thoroughly dry take it to the mill, and see what a broad smile Mr. Harris will put on as soon as it begins to rattle through the mill.—*Florida Agriculturist.*

A CANE-CUTTING MACHINE.

The *Louisiana Planter* has had a visit from Mr. Jules Gaussiran, who is the inventor of a cane-cutting machine, on which Mr. J. P. Baldwin writes :—

The average planter, with the scepticism born of long experience, is inclined to regard a cane-cutting machine that will do its work successfully as being almost as hard to build as a perpetual motion machine. However, Mr. Gaussiran's machine seems to have the distinction of having actually cut cane, and to be a success in *bonâ fide* field practice. Mr. B. A. Oxnard, of the Adeline Central Factory Company, is using one of the machines this year, and he has written to Mr. Gaussiran saying that he is highly pleased with it, and that he can conscientiously recommend it to sugar planters as an effective labour-saving device.

Mr. Gaussiran, in speaking of his machine, says :—The merits of this machine can scarcely be appreciated without a careful calculation of the expense it will save. In the first place the machine is guaranteed to save 25 per cent. of the labour employed under the present method of cutting cane for the mill, and 40 per cent. of the expense of windrowing cane for seed, or in case of freeze. And in this connection it is safe to say that in some instances the machine might be the salvation of one's whole crop by enabling a planter to put his cane into windrows quickly in case of severe weather. Secondly, it will save the entire expense of stubble shaving for the ensuing season, as the machine shaves the stubble itself while it cuts the canes. But above all of its economical features is the depth at which it cuts the cane. It is claimed by me that the machine will cut the cane from 2 to 3 inches deeper or lower than the ordinary cane knives can cut it. As it is probable that the planter would not desire to cut lower than 2 inches, let us base the following calculation upon that depth. The ordinary sugar cane will average four canes to the foot in the row; the rows are 210 feet long, which would give an average of 840 canes in each row ; there are 30 rows to the acre, which gives an average of 25,200 stalks of cane per acre. Now, if this invention cuts 2 inches deeper on every stalk of cane, it will save the sugar planter 50,400 inches of cane to each acre, or 1,050 stalks of cane 48 inches in length. The average weight of a stalk this length is 2 lb. ; hence the machine will save 2,100 lb., or a little more than a ton to the acre. While cane is worth 4·00 dollars per ton, the machine will save 4·00 dollars per acre on account of this advantage in depth. A man with 100 acres of cane will save 400 dollars in one

season, in addition to 25 per cent. of the labour employed in cutting cane for the mill, and about 40 per cent. of the expense of labour employed in windrowing, and in addition also to the cost of stubble shaving. Then there is to be considered the absolute safety against having the cane ruined by a freeze while being harvested.

If Mr. Gaussiran has solved the cane-cutting problem he will have the gratitude of the cane-planters of the whole world, and they will rejoice to see him reap the financial reward which such a device would certainly secure for him. As soon as Mr. Gaussiran completes arrangements for the rapid construction of his machines he will advertise them extensively in this journal. Some five or six planters are using them this year.

Mr. Jules Gaussiran is now operating in this section on a cane-cutting machine which cuts the cane at any depth in the ground. I have seen this machine cut medium heavy cane successfully, but cannot say how well it would work on canes partly lying on the ground; but for cutting canes intended for seed cane, this machine enables one to cut the canes so low that nearly all the roots may be left on the canes, besides saving several additional eyes. When it is desired to leave the stubble in the ground for raising a stubble crop the next year, then the machine cuts the cane near the surface of the ground and leaves some loose dirt protecting the stubble on top. It would seem that leaving the roots on canes would assist them in withstanding our Louisiana winters when laid down in mats for seed cane, the roots furnishing the canes with sufficient moisture to prevent dry rot. While this machine does not strip and top the canes for the mill, yet I am confident that cane-cutting machines will come into use in Louisiana. Mr. Gaussiran's machine resembles the usual two-wheel vehicle drawn by three mules, except that no middle mule is used in the shafts, but the machine is guided by the two mules outside of the shafts. This leaves the space usually occupied by the middle mule for the standing cane just before being cut. In other words, one mule and one cartwheel goes on one side of the cane row, and the other mule and cartwheel goes on the opposite side of the cane row. There are also two other mules that push the cart from behind. The axletree is curved up in the middle to allow the canes to pass under just as they are cut and fall forward. The cutting of the canes is accomplished by two steel discs, placed underneath the axletree of the machine. These discs revolve horizontally, and are attached to the journals, which are adjusted to the desired height. The discs below the axletree above and the two sides of the frame form a rectangular opening or throat, through which the canes pass, root ends backwards, as the machine advances forward. It is proposed to make future machines with each disc 3 feet in diameter. The edges of the discs lap 2 inches. This would leave some 30 inches space between the journals of the discs. It is considered that this 30-inch space or throat will be wide enough to allow a heavy growth of cane to pass through just as it is cut and is falling forward to the ground. The discs are partly in the ground, at the roots of the cane, and I did not observe that any canes were cut in two near the middle by falling forward on to the ground before the discs had passed on out of the way. The lower ends of the cane just cut are steadied by some soil clinging to the roots, and the tops of such canes fall forward against standing canes just to be cut. This seems advantageous, as the cut canes cannot fall clear down until the machine has passed. The weight of these cut canes resting against the canes next to be cut permits the discs to do the cutting without pinching. Some years ago I believed that, whereas a stubble shaver would cut off the stubble cane without pinching, the same discs might pinch when being driven forward into canes several feet high, and that when attempting to cut long canes some device would be necessary to bend the canes forward just as they were being cut, so as to make the clearance and prevent the excessive pressure against the canes which might push the lower end of the cane out of the ground without cutting. I was gratified to see that no difficulty of this kind was encountered in Mr. Gaussiran's machine.

I should certainly have used this machine this fall when putting cane down for seed, and for planting, had we been able to have secured it, as this machine accomplishes the same results that are accomplished by the grubbing hoe, which cuts the canes off down in the ground.

Of course there are details of construction and of design, and some improvements, which must be made, but the improvements will probably be forthcoming.

A COCOANUT ANALYSIS.

Several Northern cultivators have planted cocoanuts on their estates, and the Department of Agriculture has also made plantations on various islands on the Northern coast. The prevailing idea with most persons unacquainted with the nature of the cocoanut palm is that the nut need only be buried in the sea sand to germinate and rapidly grow into a fine tree. As a matter of fact the palm demands more nutritious food than is to be found in sea sand; and this is shown clearly by the following analysis made by Dr. F. Bachofen, who is in charge of Mr. A. Bain's chemical laboratory at the Ceylon manure works. Mr. Bain says:—

Though there exist several analyses of parts of the cocoanut, no one seems to have undertaken the task of getting a complete analysis made with a view of ascertaining the actual demand made by the cocoanut upon the mineral constituents of the soil. Yet this knowledge is of paramount importance to those going in for manuring, owing to the different customs which prevail, either of exporting the whole or only part of the nut.

I am glad, therefore, to have the opportunity of supplying those interested with a complete analysis executed by Dr. F. Bachofen, in charge of my chemical laboratory. Together with the analysis will be found a table showing the quantities of the more important constituents removed by 1,000 cocoanuts from the soil:—

Analysis of the Coconut.

	Husk.	Shell.	Kernel.	Milk.
Total weight in lb.	2·702	0·546	0·875	0·593
,, in per cent.	57·28	11·59	18·54	12·58
* Moisture in per cent.	65·56	15·20	52·80	
* Dry matter in per cent.	34·44	84·80	47·20	
Pure ash in per cent.	1·63	0·29	0·79	0·38
Containing, viz.:—				
Silica, SiO_2	8·22	4·64	1·31	2·95
Oxide of iron and alumina, Fe_2O_3 Al_2O_3 ...	0·54	1·39	0·59	trace
Lime, CaO	4·14	6 26	3·10	7·43
** Magnesia, MgO	2 19	1·32	1·98	3·97
Potash, K_2O	30·71	45·01	45·84	8·62
** Soda, Na_2O	3·19	15·42		
Potassium chloride, KCl	...	...	13·04	41·09
Sodium chloride, NaCl	45·95	15·56	5·01	26·32
Phosphoric acid, P_2O_5	1·92	4·64	20·33	5·68
Sulphuric acid, SO_3	3·13	5·75	8·79	3·94
	100·00	99·99	99·99	100·00
** Containing total potash, K_2O	30·71	45·01	54·05	34·54
* Containing nitrogen, N	0·137	0·100	0·504	

Thus, of the more important ingredients of the soil, 1,000 nuts remove the following:—

In lb.	Husk.	Shell.	Kernel.	Mi	Total lb.
Nitrogen, N	3·7017	0·5460	4·4100	...	8·6577
Phosphoric acid, P_2O_5	0·8456	0·0735	1·4053	0·1279	2·4523
Potash, K_2O	13·5255	0·7127	3·7362	0·7783	18·7527
Lime, CaO	1·8234	0·0991	0·2143	0·1674	2·3042
Sodium chloride, NaCl	20·2375	0·2464	0·3563	0·5431	21·4233

DR. MAXWELL'S REPORT ON THE SUGAR INDUSTRY.

THE *Queensland Mercantile Gazette*, commenting upon the visit of Dr. Maxwell to report to the Minister for Agriculture on the position of the sugar industry in Queensland, says :—

The Government's action in employing a sugar expert to report upon an industry of such importance as sugar undoubtedly is to the colony, is fully justified by Dr. Maxwell's report, which has just been published. Apart from the fact that a large sum of public money is directly invested in the growth and manufacture of sugar, the industry booms large as a factor in the productive wealth of Queensland, on account of the satisfactory returns per acre, and its inherent tendency to close settlement.

With the majority of Dr. Maxwell's report, those most directly interested will, with few exceptions, undoubtedly agree. For years past it has been too well demonstrated by bitter experience that the land in various districts has become exhausted. Year by year the sugar districts from the Logan to the Pioneer have borne reduced crops, until at last, in the former place, sugar is almost a thing of the past. What has happened there will surely occur further North, unless steps are taken on the lines laid down by Dr. Maxwell towards the revivification of the soil. The marvellous results obtained at Hawaii cannot be hoped for here owing to different climatic conditions, but with careful cultivation, intelligent manuring, and judicious irrigation, we see no reason why good returns should not be obtained from land at present practically thrown out of cane culture ; while in the far North the crops should become such as to well repay the laborious energy and enterprise expended in converting the dense scrub lands into waving canefields. No one, unless they have gone through the experience, can have the remotest idea of the work that has been done in years past in this direction. Millions of money have been spent, and indomitable energy and perseverance intelligently applied, but with the idea that the soil was so rich and the rainfall so copious that no artificial aid was necessary. And yet, twenty years ago men, with the authority of experience of other lands, advocated the application of manure and water, but their advice was unheeded. This was but natural when the rain was measured by feet in the wet season, and the soil so stimulating that the planter's one trouble was the quick growth of weeds—not the poorness of crop. Had such advice been listened to, what a different tale would be told to-day! At that time money was being freely invested in the industry, and the extra cost of irrigation and chemical works would not have been of much moment, more especially as sugar was then of such high value that the extra outlay would soon have been repaid.

Dr. Maxwell's recommendations, briefly put, are—the appointment of a specially qualified man to supervise and instruct the planters in cultivation in all its branches, including irrigation. The chief stumbling-block seems to be that of expense, seeing the low price to which sugar has fallen. It is undoubtedly a question upon which the master minds of the industry (and there are many) must bring their best intelligence to bear. If this be done, we have no doubt a solution of the problem will be found. The matter of irrigation has been discussed many times, without any satisfactory conclusion, except at Pioneer, on the Burdekin. This estate is in a dry belt, but by the aid of irrigation the returns per acre are greater than in any district south of Townsville. In the absence of technical knowledge it would ill become us to discuss this problem, beyond stating the fact that every sugar district has a river with a copious supply of water running through it, so it is patent that the first means towards irrigation are at hand.

As regards manure, there is a plentiful supply at our doors, but whether of suitable quality we must leave the experts to decide. There is one sugar district blessed with meatworks, yet they find a difficulty in disposing of their desiccated refuse locally, although the price is within reach of all farmers. A shipment of superphosphates—claimed to be specially adapted for sugar culture

—was landed last month in Brisbane, and, although quoted at a reasonable price, failed to find buyers amongst the sugar-growers. These facts seem to point to the desirability of the Government acting upon Dr. Maxwell's report without delay. In our opinion, a conference of the leading men of the sugar industry should be called to give effect to the expert's recommendations, and to devise some scheme to meet the initial expense, which intense cultivation and irrigation would necessarily entail. If the results predicted by Dr. Maxwell followed, such outlay would be repaid tenfold by better crops, and a regular and yearly-increasing expansion of the industry.

[Since above was put in type an association has been projected in Mackay, and will meet at an early date.—Ed. *Q.M.G.*]

COFFEE NOTES.*

The consumption of coffee is constantly and rapidly increasing all over the world, but during 1898 the increase in production was even in greater proportion than the increase in consumption.

The consumption in various countries is calculated to be as follows;—

Country.	Per Head. lb.
Holland	23·
Denmark	15·
Belgium	11·
United States	9·95
Germany	5·25
France	3·25
Great Britain	0·70

Thus it will be seen that Great Britain is the least consumer.

Each pound of ground coffee will produce 16 gallons of a palatable decoction.

The prices for the raw bean range from 3d. to 1s. 5d. per lb.

The best coffee of commerce is Mocha, grown in Yemen and other parts of Arabia. The second in value is said to be Java coffee.

The Mocha berry is small and of a dark-yellow colour. Java and East India varieties are large, and of a faded yellow tint.

American coffees are generally of a slaty or greenish colour.

Coffee improves with age both in taste and aroma, and if kept in a perfectly dry atmosphere is supposed to reach perfection in the eighth year. As it ages it loses weight by evaporation; consequently, as it is sold by weight, holders are anxious to sell with the least possible delay.

In the process of roasting, 10 per cent. of the original weight is lost by evaporation.

The best coffee is of a greenish-yellow colour; excessive greenness is considered generally to indicate immaturity of the berry or artificial colouring.

Brazil produces more coffee than any other country in the world, and calculations with reference to yield of crops refer to the period of twelve months, beginning 1st July and ending 30th June.

The exports of coffee from Santos reach 6,000,000 bags annually, and from Rio 3,500,000 bags. It is calculated that during the year 1899 the production of coffee throughout the world was 1,638,120,000 lb., and that it may attain to 1,796,256,000 lb. in 1900.

The cultivation of the coffee plant is rapidly extending in Brazil, Mexico, Costa Rica, Columbia, and Venezuela. For commercial purposes Rio coffee is divided into five grades: Fine, superior, good, medium, and ordinary.

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*From a report published in the *Journal do Commercis* of Rio de Janeiro on the production of coffee in Brazil, a *resumé* of which report was issued by the Foreign Office in September, 1899.

Fine consists of grains more or less uniform in size.

Superior.—In this grade the grain is uniform in size, but hulls and other extraneous matters are admitted.

Good.—In this selection, uniformity of grain is not absolutely necessary. It may contain some discoloured grains, but no stones or other extraneous matters are admitted.

Medium contains some defective grains, hulls, pieces of wood, stones, and sometimes earth.

Ordinary contains the same substances in a larger or smaller proportion, as well as broken grains and those of lowest quality.

REMARKS ON "COFFEE NOTES."

By HOWARD NEWPORT,
Instructor in Coffee Culture.

It must be borne in mind in perusing this that it is from a report written in and by the Government of Brazil. The point of view, therefore, is Brazilian, and the report as a whole is tended to make the best of things from a standpoint in apposition to that of a high-grade producing country.

Brazil produces a very large amount of coffee—in fact, somewhere about two-thirds, if not three-fourths, of the world's supply; but, owing to methods of cultivation, curing, &c., due to various causes, the output is of a low grade, or not on a level with that of most of the other coffee-producing centres.

The best coffee of commerce is undoubtedly Mocha; but it is not mentioned that the supply of either this or Java is very limited indeed.

Mocha is judged by size, shape, and liquoring qualities—colour not being taken into consideration, perhaps, as much as in most high-grade coffees, in most of which colour and size are the leading points that determine value.

There is a general tendency in the markets of the world to value coffees more by their analytic or liquoring properties than size or colour, and in course of time, no doubt, valuation by colour will cease, and size be only of use for expedition and ease in roasting.

Rio coffee is of a yellow colour generally, and it is owing to this and its lower quality in liquoring that it fetches the low prices it does as compared to Java, East Indies, Nicaragua, &c. For Brazil to say that East Indian coffee is of a faded yellow colour is, while having no option but to admit its superiority, grudgingly calling it poor, too! East Indian coffee, in reliable market reports, is mentioned as "greenish-blue," "grey," "greenish," "fair" or "ordinary greenish," "dull bold," "bold grey," &c., &c., but never, unless *very* second rate, as YELLOW. Excessive greenness might indicate immaturity of the bean. Excessive yellowness, on the other hand, indicates over-ripeness. Both Brazilian and Mocha coffees are gathered over-ripe—frequently gathered after they have fallen from the tree. In the case of Mocha the climatic conditions arrest the natural process of fermentation with excellent beneficial results analytically; in Brazil it is not so. Excessive yellowness or brownness—technically known as "foxiness"—is to be as much avoided, if not more so, than excessive greenness—*i.e.*, a very greenish coloured sample will sell better than a very yellow sample. Undue or excessive greenness is undoubtedly not a condition to aim at in curing, but the remark coming from Brazil savours of "sour grapes!"

From the point of view of the producers of the large quantity of lower quality the market would appear over-stocked, and the consumption rates anxiously studied. From the point of view of the producer of the lesser quantity of high quality, it must be remembered that, even though the quantity of lower grade may affect the prices somewhat, his produce is not the stuff that will remain unsold.

In conjunction with the above the following figures may be read with interest:—

Extracted from Coffee Report dated 12th January, 1900.

Planting Opinion, No. 8, Vol. V.

	Stock.		Imports.		Home Consumption.		Exports.	
	1900.	1899.	1900.	1899.	1900.	1899.	1900.	1899.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
West India	479	428	2	35	5	3	2	5
Ceylon	309	72	10	5	8	1	5	
East India	2,549	892		10	76	36	62	9
Mocha	305	506		25	16	17	2	11
Brazil	5,545	3,587	432	4	33	58	16	30
Other Foreign	5,557	8,749	213	340	205	166	232	264
Totals... ...	14,744	14,234	657	419	343	281	319	319

The preceding figures exhibit—

	Tons.
In the imports, an increase this year of	238
Home Consumption, an increase of	62
Export ,, ,,	
Stock ,, ,, ...	510

The increase of stock is a matter of future sales, the season only just beginning. The home consumption, it will be seen from these, the latest figures, is increasing, and also the output of Mocha and Ceylon can be estimated at their proper value in proportion to that of other countries.

The grading quoted in the Brazilian report is, it must be remembered, for Rio coffee, and not the general grading of coffee disposed of at Mincing Lane.

BEET AND CANE SUGARS.

The relative values of beet and cane sugars form the subject of the following report to the United States Government by the Dairy and Food Department Chemical Laboratory, Lansing. The report is dated 31st October, 1899:—

The granulated sugar of commerce, commonly known as cane sugar, is designated as sucrose by the chemist. This sugar differs from all other sugars in all its properties, physical and chemical. The sucrose from the sugar-cane is identical with the sucrose derived from the sugar-beet.

Cane sugar, sucrose, or simply sugar as it is known to commerce and in the household, exists dissolved in many vegetable juices. It is found in the stems and roots of all grasses, especially in the sugar-cane and sorghum; in fleshy roots, as beet, carrots, turnip, and sweet potato; in the sap of trees, as the date palm and sugar maple; in almost all sweet fruits, and in the nectar of flowers; but in only a few of these is the proportion of sugar large enough to make profitable its separation from the other substances which these juices hold in solution. The two principal sources are the sugar-cane and the sugar-beet.

The sugar-cane is a gigantic jointed grass very much like our corn, except that it does not ear or tassel out. It is a native of Eastern India and China, but is now grown extensively in the tropical and subtropical regions of both hemispheres. Sugar from the sugar-cane was probably known in China some two thousand years before it was used in Europe. When merchants began to trade in the Indies, it was brought westward, with spices and perfumes and other rare and costly merchandise, and was used for a long time exclusively in the preparation of medicines. It was probably first used as an article of diet in the West Indies, where the sugar-cane was introduced from Portugal soon after the islands were discovered by Columbus.

The sugar consumed in America and other countries up to 1850 was nearly all derived from the sugar-cane, but at the present time over two-thirds of the sugar used is from the sugar-beet. It was in 1747 that Marggraf, a German chemist, first discovered that beets contained crystallisable sugar identical with that of the sugar-cane. In 1776, Archard, a pupil of Marggraf, erected the first factory for beet sugar, but the 2 or 3 per cent. of sugar that could be extracted by the methods then in use was too small for commercial success. But in 1806

a new stimulus was given the industry by the large reward offered by Napoleon for a sugar that could be used on the table in the place of cane sugar shut out by the embargo acts of the war between France and Germany. The methods of extraction were rapidly improved. But at that time the percentage of sugar in the beet was small (6 per cent.), and it was separated with difficulty from the many non-sugar constituents present. Since that time a beet has been gradually developed, having a higher percentage of sugar and less of the undesirable impurities. So that from the 6 per cent. of sugar as found by Marggraf the sugar-beet of good quality now contains 15 per cent. or more; and where it took eighteen tons of beets to make one ton of sugar, it now takes less than one-half of that amount. Thus the cultivation of the beet has in a single generation shifted the centre of the sugar industry from the tropic to the temperate zone.

The methods used in the manufacture of sugar are practically the same, whether from the beet or from the cane. In brief, the juice containing the sugar is expressed or extracted from the cane or beet, treated to remove non-saccharine substances which prevent crystallisation, evaporated in a vacuum apparatus, the sugar crystallised, and then separated from the molasses in centrifugals. The sugar thus obtained, known as raw sugar, contains some impurities, from which it is separated by the refining process. Raw sugar from these various sources takes on in each the character of the impurities from which it has not yet been freed. From raw sugar the pure sugar of the market is crystallised out, and in every case the sugar is identical in chemical composition, appearance, and properties, whether it is derived from the beet or from sugar-cane. By no chemical test can pure crystallised sugar from these different sources be distinguished as to its origin. There is a popular impression to the contrary, however, and it is often asserted that beet sugar has less sweetening power, but this cannot be true, and is pure prejudice. Methods of refining raw sugar have been so improved within the last few years that it may be truly said that few products are so nearly pure chemically.

RUBBER-PLANTING.

CERTAIN portions of Queensland appear to possess a soil, climate, and timber growth identical, except in the kinds of timber, with the conditions found on the Atlantic or Gulf sides of Mexico. This zone includes portions of the States of Vera Cruz, Oaxaca, Chiapas, and Tabasco. Here the temperature ranges in summer from 75 degrees to 96 degrees Fahr., and in winter from 55 to 86 degrees. The rainfall varies from 95 to 130 inches per annum. It is under these conditions that the variety of rubber, *Castilloa elastica*, flourishes best. If we consider the climatic conditions of the districts around Cairns, Geraldton, and Cardwell, we shall find that in rainfall, temperature, soil, and elevation they compare most favourably with the conditions which obtain on the Atlantic side of Mexico. At Geraldton the mean annual rainfall is 148·80 inches; the rainfall during 1898 reached 139·94 inches, the number of wet days being 145. At Cairns the mean annual rainfall is 98·34, and at Cardwell 87·54, with 131 and 106 rainy days respectively. The summer heat on the Johnstone River varies from 85 to 95 degrees Fahr. at midday in the shade; the winter temperature ranges from 70 to 80 degrees Fahr. At 10 p.m. the summer range is from 70 to 80 degrees Fahr., and the winter temperature at the same hour averages from 40 to 60 degrees Fahr. The jungle consists of a dense mass of lawyer canes, bamboos, bananas, climbing raspberries, vines, with an occasional clump of trees. The soil is of the very richest description, having a depth of from 10 to 20 feet of the same character as that on the surface. Vast stretches of this fertile land are still unalienated. Standing on the summit of a hill, one looks over a vast expanse of level country stretching away in all directions and covered with the primeval scrub In the upper reaches of the south branch of the river, where a waterway has been cut through the volcanic soil by the water, a depth of even 100 feet of soil identical with that on the surface is visible.

Here then we have the ideal country for the growth of the rubber tree. It will be observed that the clearing of these scrubs is not nearly such a formidable undertaking as the work in the Southern scrubs, where the timber is of great size and growing closely together. It would then appear that the best way in which to plant the rubber trees would be to clear lanes through the scrub in which the planting could be carried out. There has, however, been considerable controversy as to the advisability of planting in the shade or in the sun.

Mr. J. C. Harvey, in a letter to *The India Rubber World*, says that a resident on the Pacific side of Guatemala stated that trees suffered from sun exposure there, and gave little sap. Locality, however, had much to do with this. His own observation was that on the Atlantic side of the Isthmus of Tehuantepec the tree grew with astonishing rapidity and vigour. Trees could be seen there that had attained a height of 10 feet in two and a-half years from the seed, had a diameter of 4 inches, and bled copiously when incisions were made. It is proper to state that these results are in the case of trees planted in the best soils, rich loams with ample drainage. Under such conditions trees of this age have flowered and borne seed. Mr. Harvey goes on to say that much may be said in favour of forest planting—that is to say, clearing away vines, saplings, and underbrush, leaving only the heavy timber standing, and planting the rubber seeds wherever space permits. Following this plan, which is the one we would suggest for planting rubber trees in suitable Queensland scrubs, the expense of preparing the land is much less; weeds grow less rapidly in the shade than in the open, on ground which has been burnt. On the other hand, trees grow much faster in the sun in the region referred to, and certain crops, such as corn, potatoes, beans, &c., can be successfully grown amongst the young rubber plants. If the question be raised as to the future welfare of the trees as grown in the open sunlight, evidence exists in the hundreds of old trees which can be seen about certain Mexican villages and around the coffee estates, which have for years been standing in full sun without ill effect.

As to soils, we have already pointed out that the rich scrub soils are best suited to the rubber tree, but good trees can be met with growing in gravelly clays, although none are found in ill-drained clay soils or swamps. In the case of trees growing in the open, 250 to 300 trees per acre meet Mr. Harvey's idea for permanent growth, though in the beginning the trees are grown close, about 4 to 6 feet apart, to shade the ground and keep the weeds down. Then in the second, third, and fourth years thinning out is done, and a little rubber obtained from trees 5 to 10 feet high, which may be destroyed to allow room for the development of the permanent trees.

As to treating the *Castilloa* as an annual crop in the form of fields of seedlings to be pulled up and the sap extracted, we pointed out in a former number of the *Journal* that a series of experiments was being carried on in London and Trinidad by which it was proposed to secure rubber from year-old trees of the *Castilloa elastica*. It was found that 8 per cent. of fine rubber could be extracted from such trees by a simple process with but little machinery. The experiments further showed that at present prices 8 per cent. of rubber would return an estimated profit of from 200 to 400 dollars per acre.

On this point Mr. Harvey is not yet prepared to express a decided opinion, as mechanical difficulties in connection with extracting the sap suggested themselves to his mind. Still, seed sown in a seed-bed promptly after harvesting gave a stand in three weeks of fully 95 per cent., and four months later the trees stood a solid mass, 24 to 37 inches in height, with stems ¼ to ½ inch thick. If such results could be obtained on a large scale, the yield per acre would be enormous. By careful experiment with cultivated trees at three years of age, and with different sized trees in a natural state, a very satisfactory yield was indicated, the average of which fairly established a production commencing with the sixth year and rising ¼-lb. to 2 lb. during the succeeding five years, although this was far below the quantity given by many writers and planters.

Some writers say that five years is sufficient time to wait before commencing to tap, whilst others recommend seven or eight. No doubt excessive draining of sap before the trees attain size and strength would be injurious, but, as there appears to be every probability of a long era of high prices, careful calculations show that a good profit can be made on a plantation which is made to begin yielding in five years, provided the average yield for the next five years is 1 lb. per tree, even if the trees should be exhausted by that time. With 300 trees to the acre, yielding 1 lb. each at 40 cents (gold) per lb. as the local selling value, the return for five crop years would be 600 dollars per acre with a necessary investment not above 80 dollars.

Much higher figures, for both yield and prices, are calculated on by most planters, but so far as Mr. Harvey is concerned, if this estimate were cut in half by actual results, the reward for time and money spent would probably exceed in profit any other known agricultural enterprise.

Now, there are many planters in the North who cultivate the richest of Australian land on the banks of the rivers before mentioned. With an expenditure of a fraction of their time they might sow a few hundred seeds of the *Castilloa elastica* both in the open and in the partially cleared scrub. If the trial proved successful, they would have provided a splendid asset for themselves and their posterity. If it failed, they would still have done good service by showing that rubber cultivation in North Queensland could not be carried out with any hope of success.

COFFEE CULTURE IN QUEENSLAND—No. 3.

BY MR. HOWARD NEWPORT,
Instructor in Coffee Culture.

THE SELECTION OF LAND AND LOCALITY.

HAVING got the nursery under way, and the number of plants required growing and needing very little attention, the land to be opened must be carefully chosen.

If the nursery is planted up in June or July from seed put out in May or June, there should be time, between then and the first rains, which will commence in January or thereabouts, for the selection of land, felling, burning, and clearing. During the first rains, or earlier if possible, the land must be pitted, and very soon afterwards planted up—advantage being taken of the rains to give the plants a good start on transplantation.

The matter that claims attention next, therefore, is that of choice, or selection, of the land that is to be opened under coffee.

The subsequent prosperity of an estate often depends as much on its aspect and lay as on the fertility of soil. An error in judgment of soil might be remedied by cultivation or manure, but an error in climate, aspect, lay, or elevation can only be deplored.

Climate.—The climate necessary for coffee cultivation is naturally a humid tropical one. Coffee is, however, not so difficult to please in this respect. A climate may be too cold, but coffee will thrive in a wonderfully hot temperature if there is sufficient humidity. An ideal climate would be one having a fairly even rainfall through nine or ten months in the year, and a temperature never dropping below 50 degrees or rising above 90 degrees Fahr. The climate in tropical Queensland is eminently adapted to the cultivation of coffee, and the land along the coast and on the slopes of the mountain ranges almost anywhere north of Rockhampton affords climatic advantages not to be found in many of the countries where coffee is extensively grown.

Elevation.—The climate in Queensland at sea level is very similar to that of India, Ceylon, Java, or Jamaica, at a level of 2,500 to 3,000 feet above the sea. The similarity in vegetation is very marked. From sea level up to 1,500 to 2,000 feet it is admirably adapted to coffee culture.

On the higher levels, frost is occasionally met with; but with judicious selection the parts liable to frost may be avoided. There is more frost experienced in the valleys among the ranges than on the higher peaks on the outskirts, or overlooking the plains; and in the same way in the southerly districts on the plains rather than on the hills 200 to 500 feet higher.

With regard to elevation, therefore, it is a mistaken idea to suppose that it is necessary in Queensland to go to hill country to obtain the climate suitable for coffee culture. Coffee can be successfully grown on the plains at sea level in this country, although in many countries it is found that the ranges are the only places where its successful cultivation is possible.

The effect of elevation on the product is to give a better quality of bean in the higher levels with a high analytic value, but lower bearing capabilities, and at lower levels to give a larger bean and more of it, but of a somewhat poorer quality.

One of the strong points that Queensland has in its favour is the possibility of its producing, even at its low levels, a bean equal in quality to that produced from the high levels of most other countries, and it combines with this a fertility of soil far in advance of most.

Aspect.—In this matter the direction of the prevailing winds has to be taken into consideration. Wind affects the coffee tree in many ways; but without taking into consideration the direct injury to trees young or old, the exposed situation enhances the cost of the cultivation by their requiring staking, heavy earth mulching, and extra attention to trees, that an estate with a good aspect reduces to a minimum. Those who have estates old enough to require this, and have had to do any staking, will appreciate the remark, perhaps, more than those for whom the article is written—*i.e.*, those who are still able to choose.

It is well, therefore, to choose an aspect protected from wind. As a general rule in North Queensland, it would appear that the prevailing winds are south-east or easterly; therefore a westerly or north-westerly aspect would appear generally to be the better.

It must be remembered, however, that aspect is a matter that differs very materially in different districts, and is affected by a high hill in the vicinity, proximity to seaboard, &c.; and frequently, where the soil is volcanic, it will be found that coffee, in one district, will grow luxuriously on one slope while it will barely live on the opposite facing of a valley, matters being reversed in the next district.

Again, a mountain range will so affect the direction of the wind as to frequently bring it in almost full force into a clearing from quite an opposite direction to that from which it is blowing on the top of the peak.

The general rough-and-ready way of deciding on an aspect is to note the timber growing on the land. If cold and bleak, the nature of the timber will indicate it; if windy, the straggling upper branches and the tops of the trees will show signs not only of wind, but the usual direction of it. Even the stems of the trees will show a tighter and close-grained bark on the cold or windward side.

Having decided on a piece protected from wind, which is perhaps the most important point to be considered, the amount of sunshine the block will have on being cleared must next be taken into consideration. An easterly or north-easterly aspect is frequently advised, on account of the morning sun. It is certainly a good thing to avoid the fierce blaze of the sun for the whole day; and where the climate is humid, the rainfall heavy and the elevation low, the morning sun is better than either all day sun or afternoon sun. This, however, is by no means the only point to be considered; in higher elevations the effect of frost is by no means to be ignored. It is not the actual low temperature of the climate that does the harm to the coffee, but the too rapid thawing afterwards. A frost-bitten tree will show no signs of damage even on the tenderest leaves before the sun rises after the night of frost, and, if the direct sunshine can only be kept off the trees long enough, no harm would ensue from several degrees of frost.

An estate, therefore, that is protected from the morning sun, where frost is prevalent, will generally escape damage, while the neighbouring place, on the opposite side of the valley, perhaps, will lose top primaries, and, if young, whole trees.

With respect to this, it would be as well to bear in mind that cold air being the heavier displaces hot air, and therefore at high elevations a valley or hollow will be susceptible to cold and frost, while the higher ridges may be free; and in low elevations, especially in the North, the hollows never falling so low in temperature as to be frosty, are cooler and better for coffee, the evaporation of moisture being less.

Lay.—In choosing the lay of the land remember that coffee abhors a dead flat. In most estates a few trees here and there may be on a flat and still doing well, but in large areas coffee will never be at its best on the absolutely level land. On the other hand, too steep land is difficult and expensive to work, and liable to excessive "wash" in rainy weather, and is frequently rocky if not underlaid by slab or sheet-rock. A gradual slope or gently undulating land is best for the culture of coffee, and the cheapest to work.

In the lay of the land drainage must be considered. The subsoil or underground drainage must be complete and regular, and on the surface not too rapid. On flat land there is always a possibility, however carefully the surface water may be run off, of the subsoil drainage being too slow and water being retained there, making the soil sour and heavy.

Moreover, on the lower slopes of mountains or gently undulating plains, the soil will generally be richer and more lasting, while steeper land has lost a large proportion of its vegetable mould and humus by the washing of the surface down to the plains and hollows.

The general nature of the land must be observed also. If a natural creek runs through or alongside, note whether the banks are small and shallow, or whether there is a good "fall" which will permit of natural subsoil drainage.

If there be no stream at all, more or less expensive drainage will have to be resorted to. Marshy land is worse than a dead flat, for the stagnant, cold, and sour water is not only in the subsoil, but at the surface also. Land that becomes flooded in the rains should also be avoided. Coffee has been known to survive innundation even, but where this has happened the rise of water has been sudden with no wash, and has fallen again quickly, the land being thoroughly drained again naturally. Generally, however, the trees will either die out or the crop be lost. Stiff clay beds and slab or sheet-rock must also be avoided, but boulders, if scattered about, are indicative of good soil between, generally, and are of no disadvantage. On the other hand, stones loose on the surface or deeper in the soil mean expensive pitting, weeding, and working. It is well, in selecting the lay, to keep an eye on such matters as sites for buildings, especially the pulping and curing sheds. The proximity of a fall of water, if only 6 or 8 feet, is an enormous advantage, possibly supplying power as well as water, and saving pumping work and machinery. The sheds or machinery some distance off mean a deal of labour and expense in transport, while soil a degree poorer may be more than compensated for by having these in close proximity.

Soils.—It is not every coffee-grower that can afford to have his soil analysed, and, therefore, perhaps a hint or two that can be made practical use of in choosing coffee soils may be of advantage, although I do not intend giving a scientific treatise on soils, or resorting to technical phraseology.

The best soil for coffee is a deep, porous, vegetable mould; a tendency to sandiness is of advantage, though too sandy a soil will be found soon to lose what little humus it possesses, and become unfertile. Heavy or clayey soils should be, as a general rule, avoided. The rich, porous, vegetable, surface mould will retain a considerable amount of moisture, and absorb it from the atmosphere, while the light sandy soil will retain but little. The soil with a tendency to sandiness will do better with a heavier subsoil, and the sandy or gravelly subsoil will, to a great extent, counteract any tendency of a heavy or rich vegetable surface soil to retain too much moisture.

The ordinary rough-and-ready method among coffee-growers in all parts of the world in selecting land is to judge by the vegetation growing on the land. Good scrub, tall and straight trees, especially soft-wooded trees, will seldom grow where the soil is poor. The bush and weed growths are reliable indications also, and in a very little while the presence or absence of certain plants will be noted and remarked on as a good or bad indication of the suitability of the soil to the growth of coffee. For instance, the presence of the common bracken fern in some coffee-growing centres is considered a good indication, and I have had the presence of the lawyer cane pointed out to me in Queensland as indication of rich scrub land.

It is always well to take a spade when attempting to judge soils, and to make a hole here and there, cutting straight down on one side, and noting the depth as well as the quality of the surface soil, top subsoil, and lower subsoil.

If the surface or top soil is fairly dark, loose, and porous, and full of small rootlets, it will be an indication of richness in humus, which, in other words, is organic matter including nitrogen. A rough-and-ready test of subsoils among coffee-planters is to take a handful up and slightly squeeze it; then turn the hand over and drop the soil quickly. A light porous soil will fall in a shower and leave some adhering to the hand; a heavy soil will fall in small lumps and leave the hand almost clean; clay will bind and fall in one ball, leaving a sticky indication on the hand somewhat like a coat of paint.

Another rough-and-ready test of the absorption of subsoils is a bucket or two of water. Having saturated the bottom of the hole, pour in a bucket of water and note the time it takes to disappear. If it takes long, you may be sure that in wet weather the coffee will suffer before the subsoil can be effectively drained.

For surface soils there are several rough-and-ready tests. A little soil shaken up in a bottle of water and left will settle down showing the proportion, roughly, of course, of fine gravel or coarse sand, fine sand, clay, and mould. The presence of excessive lime may be determined by the addition of a little vinegar, when a slight effervescence may be observed. Soils containing an excess of carbonate of lime, however, would appear to be rare in North Queensland.

The amount of humus may be found by drying some soil carefully in the sun, weighing it in small scales, and then burning it on a bit of tin or iron heated to redness over a flame, and noting the difference in weight. Percentages could not, of course, be determined by the ordinary grower, and would, in many cases, be of no use if determined, but if these tests be applied it is remarkable what differences can be found in apparently identical soils, and for matter of comparison they will, I know from experience, be found very useful. The subject of soils is a vast one, and is worth reading up and studying if the grower has time and inclination to do so.

Colour is generally not much guide until experience has, in any one place, shown that soils of certain colours are good, bad, or indifferent. Generally, a chocolate-coloured soil is good, but some of the richest I have met with here in Queensland are quite light in colour. Soils vary very much indeed, and would seem to be peculiarly patchy, differing in colour and consistency to a great extent, even in a small clearing. Red and dark-chocolate soils are also good, and even black soils in Queensland will carry coffee well. Clay soils and excessively sandy soils are to be met with in some of the heavy rainfall districts, as well as on the coast. The sandy soils are frequently poor in humus, weak and likely to change for the worse on the scrub being removed. Most soils change in colour on being exposed to the sun, and those that appear clayey on the surface often prove friable on cultivation.

A deep black soil frequently denotes a heavy subsoil. Such soils are to be found not infrequently on forest land. The deeper the surface soil the better for coffee, for it is on the surface soil that the tree principally lives. In examining soils, it will generally be noticed that the soil gets lighter in colour as it gets deeper; the true subsoil is not reached, however, until the nature of the soil changes.

Old Land.—Instances may occur where the land selected has previously been opened and there is no vegetation on it to judge by. In such cases the aspect, lay, &c., being satisfactory, one must judge by the soil alone Beware, however, of land that is covered by couch-grass. However good the land may be, the work of exterminating the couch-grass will be enormous; and if left, the raising of young coffee plants will be almost an impossibility. When the pits are dug and filled in again, the grass will extract all the goodness of the new soil and choke the roots of the young plant. It would be much cheaper and better, in the long run, to start a new field from which couch-grass can be kept out.

If the land has grown a secondary scrub it is easier to judge—the effect of wind and weather is more apparent, and such land is more easily reclaimed than land under grass. Once scrub has been removed, however, rain water begins to wash the surface; and if it has been open some time, with careless cultivation, the soil becomes much impoverished by the washing away of surface mould. A soil that has become gravelly on the surface had better be avoided.

Scrub and Forest Land.—I have seen patches of forest land in several districts eminently suitable for the cultivation of coffee. It must not be considered that because scrub land is generally the best, or, in other words, the land under climatic conditions that suit coffee has generally previously grown scrub, forest land is never worth planting. I have seen scrub land that happens to be well protected in every way which nevertheless had a soil so poor and gravelly or stony and clayey that it would not pay to put it under coffee. Such lands would appear to have grown scrub because of being so favourably situated that bush fires never touched them, while patches of forest land, in which scrub timbers would grow luxuriantly, were prevented by the periodical fires which only the hardiest of trees could withstand.

The grower thinking of opening out will possibly conclude that there is a great deal to take into consideration before venturing into the cultivation of coffee. It must not be thought that it is impossible to grow coffee without all these precautions; indeed it will adapt itself marvellously to very extraordinary conditions at times; but since the object in view is to get the best returns from and to make the most of the coffee put in, it will be found worth while to take a little extra trouble in the selection of land. Coffee cultivation in Queensland (since only a few acres are required to be opened compared with most countries, and most holdings are at least of 160 acres in extent) admits of the choice of locality, lay, aspect, elevation, and frequently even rainfall, which should (while so much has to be done personally, and labour is at a premium) be taken every advantage of.

It may not be possible to get an ideal place, and it may be that a spot with only one or two of these points in its favour is selected, but still, if the disappointment, regret and expense of opening up under conditions that are eminently unfavourable, and conditions that are found to practically prevent any possibility of successful and paying cultivation are avoided, my object will be attained. It may be that the best has to be made of a place which has an unfavourable aspect, lay, or a poor soil. In such cases, soil may be improved by cultivation or manure. A windy corner of an estate may be saved by a timely belt of trees, or a frosty hollow protected for a month or so in the year with a covering of grass or straw, &c.; but it will not be possible to move the clearing, once opened, to the other side of the valley or just a few yards round the corner where experience would have taught you it should have been placed at first. Also, it will be seen that there are not one but many things to consider, and the man with the fixed and only idea, for instance, of obtaining the morning sun for his place, correct though it may be, may find his choice not as perfect or satisfactory as he had hoped, if he ignores the other equally necessary considerations.

It can be readily understood that it is a very difficult matter to give reliable advice as to the best situation for coffee without a real study of the

locality, when so many points have to be considered. Also, it can be seen that an estate with the very best of soils may lose all its advantage by a bad, unfavourable, or unfortunate aspect or lay, or *vice versâ*. It is my endeavour, therefore, in this article, to show the grower how he can judge for himself, and, having made himself acquainted with the conditions obtaining, what he has to look for in deciding where he shall locate his clearing.

TOBACCO IN NATAL.

In connection with Mr. Nevill's remarks on the production of cigar leaf, it may not be uninteresting to those interested in the cultivation of tobacco to read what Mr. J. M. van Leenhoff, Government Tobacco Expert, Natal, said in a paper entitled "Natal's Prospects in Tobacco Production," read at a meeting of the Inanda Agricultural Association in January last, and printed by the *Natal Agricultural Journal*.

He says:—Unfortunately it does not want much carelessness to spoil the colour of good tobacco irremedially. The Florida tobacco, grown under cover, has a much lighter colour than that grown in the open field under the direct influence of the sun-rays.

WRAPPERS.

Speaking in general, tobacco fit for wrappers will bring the greatest price, and as this kind of tobacco must burn extremely well, and be rather mild in flavour, it must be very fine in texture, with veins standing obliquely, but so thin as to be hardly visible; it must further possess much elasticity, and have a light-brown or yellowish-brown colour (spotted or not). It must be untorn, and have a good, broad shape, while the length of the leaves should be from 12 to 18 inches. The cigar manufacturer, and especially he who pays heavy import duties, is always trying to procure for himself tobacco which, besides possessing all the abovementioned qualities, has a very light weight, because the more leaves that go to 1 lb. the less weight of tobacco he requires for wrapping a given number of cigars. Some high-class Sumatra tobacco will give 180 and more leaves of 12 to 16 inches long to 1 lb., and to wrap 1,000 cigars only 1½lb., or still less, is necessary. Thus it will be seen that he cannot profitably use all the tobacco for this purpose which is brought on the market under the name of "wrapper tobacco." He does not care so much for a tobacco which naturally possesses a good aroma, as this in some degree can be given to it by means of different flavourings, particular modes of fermenting, or great care in storing, although, of course, a tobacco possessing naturally good flavour and aroma is always much to be preferred. The manufacturer is totally unable to improve the botanical defects of a certain tobacco. To illustrate this, I give some prices of wrappers, binders, and fillers, announced for sale in *The Tobacco Leaf* of 22nd November, 1899:—

WRAPPERS—

	s.	d.	s.	d.
Sumatra	10	10	14	7
Havana	8	2	20	10
Florida-Sumatra	3	2	6	3
Connecticut Spotted	0	10	4	2
York State	1	1	1	5

BINDERS—

Connecticut Broad Leaf	0	10	1	6
Pennsylvania Broad Leaf	0	7	1	2
Old Wisconsin	0	7	0	10

FILLERS—

	s.	d.	s.	d.
Vuelto Abajo	6	0	6	10
Remedios Havana	5	3	6	3
Florida Havana	...		1	11
Zimmmer Spanish	0	7	0	10
Penn. Havana Seedleaf	0	7	0	9
Wisconsin	0	7	0	9

The Customs duties on tobacco in the United States are:—

	s.	d.	
Unstripped leaf suitable for wrappers	6	3	per lb.
Stripped leaf suitable for wrappers...	9	3	„
All other kinds of leaf tobacco unmanufactured and unstripped	1	5	„
All other kinds of leaf tobacco manufactured but stripped...	2	2	„
Manufactured tobacco of whatever kind	1	8	„
And in surplus an inland Custom duty of ...	0	1	„

I believe, that two years ago, the Customs duty on Sumatra and Havana tobacco was increased by 2s. 1d. per lb.

Until now only really good wrappers have been produced in Sumatra and Borneo; and although Havana furnishes wrappers as good as the best Sumatra grown, they are dearer, as they possess also a fine aroma. Planters in Florida are likely to produce an article which will favourably compete with Sumatra tobacco, through untiring efforts to improve their tobacco, and I am convinced that some soils in Natal could turn out a similar tobacco.

BINDERS.

Everything that is said about wrappers also applies to binders, and, roughly speaking, a binder is only an inferior kind of wrapper. In this case torn leaves and a less equal bright colour is not an objection as in the case of wrappers, but brown, ripe colours are certainly better than fallow-coloured, unripe ones. This kind of tobacco must burn even better still than the wrapper, or else the cigar will not burn well, which is of the greatest importance. Thus it will be seen that the fat top-leaves will never furnish good binders, and, besides being much heavier than middle and foot leaves, they will prove too dear because of their smaller wrapping capacity. A leaf which has a pleasant taste when smoked will also have a good aroma, and the better the taste and burning power the binder has, the better will be the quality of the cigar, although it is possible to obtain the quality of a cigar largely by using good fillers and taking a wrapper and binder which only possess superior burning power, great elasticity, and a very fine texture. With such coverings, cigars of an attractive appearance can be made. Usually 6 lb. of binders are needed to wrap 1,000 cigars.

FILLERS.

As stated previously, a soil which furnishes good wrapper tobacco never can be used for planting filler tobacco, and *vice versâ*. The soil for fillers should be totally different; it should be a sandy loam with a stiff subsoil, humus not being so essential. Fertilisers will be less necessary than for wrapper tobacco, and more especially as regards nitrogenous fertilisers; furthermore, the distance of the plants, the manipulation of the tobacco in the field, and the process of fermentation are also different. Up to the present the best tobacco for fillers is the Havana variety.

Here the chief thing is quality; form, shape, texture, colour, &c., are only of inferior importance. Also the burning power may be indifferent, because a cigar is almost always made from fillers of different kinds of tobacco—*i.e.*, blended. All different kinds of tobacco possess also different burning qualities, and fillers which burn less freely, when blended with fillers which burn much better, are easily consumed with the rest. The great reputation which certain brands of cigars possess almost wholly depends upon the skill of the manufacturer in blending. This is what the *Cigarette World* tells us about this very important subject of tobacco manufacture:—"The art of blending is undoubtedly one of the most important and one of the most difficult to acquire in the tobacco trade. In no industry is the aid of skilful blending so absolutely indispensable. With the exception of a few well-known loose tobaccos, all tobaccos are more or less blended. It is, in fact, precisely this very act of blending that gives to various marketable products those peculiar qualities for which they are characteristic. While no secret is made of the fact itself, the methods that are adopted are necessarily secret to every factory that employs them." The amount of fillers for 1,000 cigars of ordinary shape is about 12 lb.

CIGARETTE TOBACCO.

The countries which furnish the best cigarette tobaccos are Turkey, Greece, and Asiatic-Turkey. Some of these tobaccos obtain prices as high as those of the best Havana, 16s. per lb. The difference in quality of the many kinds of cigarette tobacco the Turkish Empire produces, is more a result of difference in the soil, as the mode of cultivation and the preparing of the leaf are nearly everywhere alike.

But the United States, notably the State of North Carolina, also produce a tobacco of which a very good kind of cigarette can be made. The best tobacco for this purpose is grown on a poor, very sandy soil, of light colour and small water-holding capacity; as soon as too much farmyard manure or fertilisers are added to the soil, the colour of the leaf becomes darker and the quality less good. But a good kind of cigarette tobacco can also be grown on a poor soil which contains a considerable part of white clay, if the land is well drained and the tobacco grown on ridges. As a rule it can be said the soil intended for growing cigarette tobacco should be the opposite in texture and structure to that suited for producing heavy, coarse tobacco. This class of soil will produce tobacco which contains but little nicotine, and the comparative absence of nicotine in cigarette tobacco is essential; good kinds contain only from 1 to 1½ per cent. of this narcotic alkaloid. Much humus in the soil is not necessary for cigarette tobacco. The crops given by such soils are, of course, very small. I remember in Sumatra, on similar very poor white clayish lands, that the acre produced was only from 300 to 400 lb. The tobacco was not good for wrappers on account of its small elasticity and dulness of colour, but the leaf would have suited very well for cigarettes, it having a naturally light-yellowish colour and good flavour if grown during a period of drought.

Tobacco grown on such a soil for cigarettes should be planted much closer than wrapper tobacco on a rich soil; it should also be topped much lower, and never more than ten leaves should be left to the plant. This tobacco should never be wilted nor fire-cured, but everything should be done to conduct the curing process as slowly as possible, care being taken that the fine light colour does not become spoiled by bad management. The fermentation is conducted quite differently from that of other tobaccos; it might be more appropriate to call this process "aging." The bundles are bulked as dry as possible, and the process lasts for at least twelve months. During this period there will be a light, almost unnoticeable fermentation going on in the bulk. Unnecessary to say, that by means of thermometers the temperature in the bulk must constantly be watched; and, if the tobacco heats in the slightest, the bulk must be broken down and built up again. Some even advocate that to make fine cigarettes the tobacco should be three or four years old.

COFFEE-GROWERS RUINED.

THE *American Grocer* gives the following :—

General Roy Stone, who has just returned fron Porto Rico, said to-day:

The story of the Porto Rican coffee-planters is short, but is one of the saddest in the history of misfortunes. Two years ago they were rich and prosperous, and their dependents, nearly two hundred thousand in number, were comfortable and contented. Their estates were worth 70,000,000 *pesos*, or over 40,000,000 dollars, and were paying them a high rate of income on that valuation. They owed a few millions of dollars, on which they were paying from 10 to 24 per cent. interest to the Spanish money-lenders, but they paid the interest easily, and, as the business was so good, instead of paying off the principal they constantly cleared more land and planted more coffee. This was unwise, perhaps, but it was enterprising and entirely human.

The war came. It cut off their open Spanish market, and, largely, the European market, which had been reached through Spanish channels; we cut off their Cuban market, and their coffee was unknown and unsaleable in America. The crop of 1898 was thus left on their hands, and when the storm of August last came it unroofed their warehouses, demolished their dwellings, mills, and machinery, soaked and destroyed the old crop of coffee, and whipped the growing crop off the trees. In one night they lost 25,000,000 dollars.

In view merely of their lost markets, General Henry, in January last, had decreed a year's prorogation of their debts, but this naturally hurt their credit, and after their hurricane losses they could not get a dollar to hire labour; their plantations were neglected, and the rank tropical undergrowth has made them impenetrable jungles, wherein the next crop will be lost unless they get help immediately to put an army of labourers at work cutting away the vines and weeds.

Meanwhile their creditors are preparing to foreclose next month, under the Spanish law, which only takes thirty days to a final eviction. General Davis does not feel authorised to grant another extension. There is no one to buy, and the property will pass into the hands of the creditors unless Congress intervenes, and the creditors are sending agents here to prevent that, while the planters have no money to pay agents and no one to plead for them. They are trusting to the care of Congress and the American people, who know little or nothing about their distress and danger. What the result will be no one can tell. Hundreds of well-to-do families will be turned penniless on the world, and their ignorant and excitable dependents left to their own devices. There is wild talk of destroying everything rather than have the Spaniards get possession. But there is no danger of that. The planters love their island, and would not ruin it for their own revenge. The situation, however, is very serious. It involves half the agriculture of the island and the support of more than half the rural population.

Just what should be done is not easy to say. It must be something more than a further extension of payments. It must provide the means for restoring the cultivation of plantations, and must assure a demand for the product.

This will be "paternalism" of the plainest type, but if we are not to make the islanders full Americans we may certainly give them every other benefit in our power, and not be frightened at our own beneficence. In any case the problem is a pressing one and a fit subject for study by thinking men in this season of leisure and goodwill.

Forestry.

SOME TIMBER TREES OF QUEENSLAND.

By J. W. FAWCETT.
Member of the English Arboricultural Society.

THE VELVET-LEAVED APPLE TREE (*ANGOPHORA SUBVELUTINA*, F. v. M.)

Botanical Description.—The Velvet-leaved Apple-tree is a large wide spreading tree, growing to a height of from 60 to 90 feet, with a diameter of from 30 to 50 inches, with glaucous or minutely pubescent foliage and young shoots.

Bark.—The bark is rough, persistent, and fibrous.

Leaves.—The leaves are opposite, or here and there alternate or nearly so, sessile (or stalkless) or nearly so, ovate or ovate-lanceolate in shape, mostly acute, broad and cordate at the base, from 2 to 4 inches long, with prominent netted veins, and of a greyish velvety appearance.

Flowers.—The flowers are small and in loose corymbs. They are in bloom from November to January.

Fruit.—The fruit is a capsule, a little more than ¼-inch in diameter.

Vernacular and Scientific Names.—The Velvet-leaved Apple-tree is so called from the velvety appearance of its leaves. The name apple-tree is applied to the whole of the *Angophora* species on account of the similarity of their habits to those of the Common Apple-tree (*Pyrus malus*, Linn.) The generic name, *Angophora*, was given to these trees by the Spanish botanist, Cavanilles, from the fruits resembling a carrying vessel, the name being derived from two Greek words *aggos* (*angos*), a vessel, and *phora*, a bearing or carrying. The specific name, *subvelutina*, was given to this species by Baron v. Mueller on account of its velvety leaves.

Distribution.—The Velvet-leaved Apple-tree is found in open forests, generally at the foot or on the sides of hills in the coastal districts of Queensland, and also in New South Wales. On account of its growing in clumps or patches, it not infrequently gives the name of "apple-tree flats" to places where it occurs.

Use.—The Velvet-leaved Apple-tree yields a strong, durable, tough, close-grained, light, pinkish-grey timber, soft while green, but very hard when dry. It is useful for indoor work, floorings, &c., and is much used by wheelwrights for naves. It is also valuable for bullock-yokes, handles of tools, and other purposes requiring toughness combined with lightness. It is very often, however, subject to gum-veins. As a fuel, it does not afford a strong heat, but it burns well and with great facility, leaving nothing but a clean white ash, which contains a large proportion of potash.

On account of its spreading foliage and easy growth, it is a useful shade tree.

THE INTERMEDIATE APPLE-TREE (*ANGOPHORA INTERMEDIA*, DC.)

Botanical Description.—The Intermediate Apple-tree is generally a medium-sized tree growing to a height of from 40 to 70 feet, with a diameter of from 20 to 40 inches. In agreeable localities, however, it has been found to reach a height of as much as 90 feet with a proportionate diameter.

Bark.—The bark is persistent and rough.

Leaves.—The leaves on the lower branches are much like those of *A. subvelutina*, F. v. M., opposite, or here and there alternate, broadly lanceolate or ovate-lanceolate in shape, from 2 to 4 or more inches long; those on the upper branches are long, narrow, and taper to a point, more like those of a Eucalypt or Gum-tree. All the leaves are petiolate or possess leafstalks.

Flowers.—The flowers are rather small, in loose corymbs or trichotomous panicles.

Fruit.—The fruit is a capsule about ¼-inch in diameter.

VERNACULAR AND SCIENTIFIC NAMES.—The Intermediate Apple-tree is also known as the Gum-leaved Apple-tree, from the resemblance of the leaves in the upper branches to those of gum-tree. The specific name, *intermedia*, was given to this species by De Candolle, the eminent Genevan botanist.

DISTRIBUTION.—The Intermediate Apple-tree is found in open forests in both the inland and coastal districts of South Queensland. It is also found in New South Wales and Victoria.

USE.—The Intermediate Apple-tree yields a strong, heavy, close-grained easily worked, greyish timber, subject to the defect of gum or kino veins, which lessens its usefulness. It is hard, very tough, and stands dampness well. It is used for naves of wheels, boards and slabs, in the construction of rough buildings, and for firewood.

This tree makes a fine shade tree, being one of the best of the *Angophoras* for that purpose. It attains a large size, grows rapidly, and has a close shady foliage.

THE RUSTY GUM (*ANGOPHORA LANCEOLATA*, Cav.)

BOTANICAL DESCRIPTION.—The Rusty Gum is a large tall tree, often attaining considerable dimensions. It grows to a height of from 80 to 100 feet, with a diameter of from 30 to to 50 inches.

Bark.—The bark is rough, persistent, and fibrous. It is also deciduous, and after it has fallen off, which it does in patches, the whole becomes smooth and similar in appearance to the Spotted Gum, *Eucalyptus maculata*, Hook., with which tree it is often mistaken by timber-getters on this account. The bark is often stained a rusty red colour from the kino or gum which oozes out.

Leaves.—The leaves are opposite, or sometimes alternate, petiolate, or having leafstalks, narrow, lanceolate, from 2 to 4 inches in length, and 1 inch or less in breadth at the widest part.

Flowers.—The flowers are in dense loose corymbs or terminal panicles. It is an abundant flowerer, in bloom from November to January, and much sought after by bees.

Fruit.—The fruit is a capsule, usually thick and very smooth.

VERNACULAR AND SCIENTIFIC NAMES.—The Rusty Gum, so called from the rusty gum stains on the bark, is also known as Red Gum, from the abundance of red kino or gum it contains; Spotted Gum, from the spotted appearance of its trunk after the bark has fallen; Sugary Gum, from its pollen being very sweet, and much sought after by honey-loving and honey-making insects; and Narrow-leaved and Willow-leaved Apple-tree, from the narrow willow-like leaves. The specific name, *lanceolata*, was given to this species by the Spanish botanist, Cavanilles, from the form of the leaf.

DISTRIBUTION.—The Rusty Gum is found in open forests both in the inland and coastal districts of South Queensland, and also in New South Wales.

Use.—The Rusty Gum yields a strong, hard, heavy, pinkish timber, subject to the defect of gum-veins, but used for the naves of wheels and in rough carpentering and outbuildings, and also as a fuel. A red-coloured kino or gum-resin exudes from this tree, which proves very useful where a strong astringent is required. Large quantities are often obtained, and as much as two gallons of liquid kino have been obtained from a single tree. The powdery deposit in cold solutions is of a resinous nature, but free from a nauseous smell.

The flowers of the Rusty Gum are greatly sought after by bees, and they produce a thick, peculiarly luscious, dark-coloured honey.

SIBERIAN FOREST CONSERVANCY.

In order to prevent the increasing destruction of the Siberian forests, the Minister of Agriculture has assigned the sum of 50,000 roubles to be expended on the forests in the Governments of Tobolsk and Omsk in accordance with the methods usually practised in the management of forests in European Russia.

FORESTRY IN SOUTH AUSTRALIA.

At a meeting of the Riverton branch of the South Australian Bureau of Agriculture, Mr. Hannaford read the following short paper on "Forestry":—

For some weeks the subject of forestry has been given some prominence in the daily papers, and for years past the planting of trees has met with considerable public and individual favour. That this is the case is only natural, seeing that South Australia, of all the Australian colonies, is the worst off for natural forests, and has been dependent for years on the sister colonies for its supply of timber. The question arises—Is it worth our while preserving what few forests we have? If it is, are the benefits sufficiently apparent to warrant expenditure in extensive tree-planting? I certainly think there are sufficient reasons why, as a colony, we should do so. This colony is subject to great variations in temperature and rainfall, and, healthy as the colony undoubtedly is, it could often be more comfortable to man and beast physically, and to the former, at least financially, without in any manner detracting from its healthiness. The bleak cold winter winds and the hot blasts of the summer might be toned down and checked in their destructiveness to crops and gardens. With regard to timber for public works we have to go outside of the colony for that which might easily be produced in the colony by small expenditure, and the timber for fencing and other public and private works must be provided by some means. The value of our hardwoods for purposes where great durability is required is beyond doubt and compares very favourably with timber imported from other colonies. For domestic purposes, being without coal or other natural heating resources, firewood must of necessity be an important item. Then there is the very important wattle and olive-oil industries. The former is, and possibly the latter will prove, sufficiently remunerative to encourage the planting on an extensive scale of the wattle and olive by private individuals. Our edible scrub, such as the she oak and mulga, must, unless grown in protected areas, become less every year. In our own district it will not be many years before the she oak disappears altogether, excepting in cemeteries or other protected spots, and the mulga of the north is gradually but surely getting thinned by sheep and rabbits. The extension of our bee culture and the protection of our birds might well be classed as one of the direct profits of tree-planting; for honey is a valuable exportable article, and birds, by destruction of insects, &c, contribute very materially to keeping garden pests in check. Nature having provided us with forests, scant as they may be, it behoves us a community to see to it that we leave to posterity a forest inheritance not only equal but superior to what we now possess. The growth of trees, in comparison with our own lives, is so slow

that the following generations will naturally reap greater benefit than the generation that plants. To this fact may be attributed, in a large measure, the amount of indifference to planting by private individuals. Another cause is that a large section of the community are tenants, which kind of occupation provides no encouragement to improve or beautify by planting. Therefore, it is a work that of necessity is or should be a national one. I notice by the papers that there are 217,189 acres of Crown lands set apart for forestry purposes; some of this, it appears, is unsuitable for trees, and is to be let for grazing. During the last twenty-two years, up to 1897-8, about £140,000 had been spent, and the returns from the forest lands, in one way and another, had been about £125,000, leaving a balance of expenditure over income of about £15,000. When we consider that most of the planted trees are not yet sufficiently grown to be of commercial use, the Forestry Department is one of the best departments in connection with our public enterprise, and, no doubt, in future years only such trees as are suited to soil and climate will be planted, thereby saving time and expenditure on unremunerative labour. During the last ten years we have imported palings and hardwood to the value of £126,000. Probably the colony is capable of growing nearly all the hardwood required; but, unless planting is gone in for extensively, our expenditure on imported timber must yearly increase. How can we increase our forests? I believe it will be necessary to proclaim large areas of the public estate forest reserves, to be let on lease for grazing and other purposes, subject to resumption for planting purposes as State finances permit. Perhaps it would be a good way to secure to futurity the blessings of the sinking fund, if it was used for tree-planting purposes; the preservation of our present State forests; the encouragement by local government bodies to assist in getting impassable roads planted, and roadsides especially, where watertables are apt to wash into deep gullies. In many places the land enclosed by our railway fences could be planted, providing in years to come sources for railway repairs, &c. How is the interest in this subject to be increased? One way, I think, would be to form in all centres of population forestry committees, the members of which could deliberate on the best means of forwarding the movement, invite subscriptions, evoke assistance of district councils, solicit the assistance of the churches to raise funds to beautify our church lands; and make our cemeteries beauty spots instead of dreary wildernesses, encourage the young by making Arbor Day of greater importance to them, establishing depôts in every township, where orders can be received and trees brought from the Government nurseries at stated intervals to fulfil those orders, and last, but not least, good example.

WOOD-PULP.

THE utilisation of the waste products of our forests is a question which will have to be considered when the proposed Department of Forestry is created. Our scrub and forests are full of the leavings of timber-getters, splitters, and sawyers. This abandoned raffle of timber has all got a money value, and that value might be obtained by converting the waste into wood-pulp. The United States and Canada are fully alive to this, so also is Germany.

The *Times* says on this point:—The extraordinary development of the single manufacture of "wood-pulp" which, only a few years ago, was practically unknown, and is now used not only for making paper but for clothing and an immense diversity of other articles, is a sufficient indication of the practically limitless extension of the already widely "varied use of timber." "Cotton," it is said on the other side of the Atlantic, "was once called king; but king cotton is a lesser potentate than king timber must soon become."

All the American papers are full of accounts of the wonderful development of the industry in that country, and of the constantly increasing uses to which wood-pulp is now put. It is, in fact, this industry that has brought home at

last to the people of America the urgency of making State reserves, protecting them from fire, and managing them systematically; for as long as lumber only was exported from the forests the younger and smaller trees were left, but now that the wood-pulp man has appeared no trees escape, as he utilises all the trees left by the lumber man.

The *New York Tribune*, referring to the numberless uses of wood-pulp and the inroads caused on the United States forests, says:—Printing paper alone eats an enormous hole in our national forests yearly, and the future extent of that requirement can only be conjectured. The huge procession of railway cars all over the country run, to some extent, on paper wheels; carpenters are beginning to use boards of paper handsomely veined requiring no planing, twice as durable as the wooden variety, and costing only half the money. The builder is introducing paper bricks, showily enamelled, which will not burn, and possess many advantages over those of burnt clay. The ship-builder introduces masts and spars of the same substance, which is likewise used for telegraph and telephone poles and flagstaffs. These are not fanciful experiments, but serious business procedures, justified by the superior durability of the articles so produced. The same quality is claimed for the paper horse-shoe recently invented and now extensively used. An enumeration of the purposes for which this surprising protoplasm has come to be employed would stretch into a catalogue, and new ones seem to be discovered every day.

Verily we are approaching the day referred to in the chorus of the old song—

> Paper hats, paper coats, paper boots and shoes,
> Patent paper sailing ships and patent paper crews;
> On the paper market there'll be a paper strain,
> And everyone, both young and old, will have paper on the brain.

The chief wood used for pulp is spruce, but silver fir is used in the Vosges mountains. Poplars, which have a short fibre, are also used, but more especially for mixing with spruce pulps to give the paper a more even surface. Of spruce there is an unlimited supply in the north-western Himalayas, from the Bhagirati to Afghanistan, also in Sikkim and Bhutun. It grows chiefly on northern and western slopes, between 7,000 and 11,000 feet. The species is, of course, *Abies Smithiana*, very closely allied to the common European spruce, *A. excelsa*. It attains a maximum height of some 225 feet, and a girth up to 16 feet. The wood is white, like that of *A. excelsa*, and weighs about the same—viz., 32 lb. per cubic foot on the average.

In the Jaunsar Division alone there is a huge stock of magnificent trees, which is unsaleable at present, as there is no demand for it. So much so is this the case that wherever it happens to be found growing near deadar, it is ruthlessly killed by girdling and allowed to rot, so as to favour the valuable deodar. I roughly estimate that from this division, were the spruce put under systematic management, an annual out-turn of 1,50,00,000 cubic feet, or about 5,70,000 maunds, equal to about 21,000 tons by weight, could be obtained. If a large quantity like this were exported, it is probable that it would pay the Forest Department to sell the wood at Dagpathar, on the Jumna, for about 11 annas a maund.

Wood ground mechanically yields, I believe, one-third of its weight in pulp (dry), and this the paper-mills would, it is supposed, willingly purchase for at least 3 rupees per maund delivered on the railway, as their agents in the bazaars are now scouring the country for old pieces of paper of all kinds which have to be sorted, washed, and bleached before being of any use. For this the agents give 2 rupees per maund, and they must get a good commission for all their trouble.

Fifty-seven thousand maunds of spruce would yield some 1,90,000 maunds per annum, or 633 maunds per diem (taking 300 working days = one year), of mechanically ground pulp, and this should sell for 5,70,000 rupees.

There is not likely to be any difficulty in disposing of this quantity, as the demand for paper in this country is steadily on the increase, more or less in

proportion to the spread of education and trade. Moreover, if good raw material were readily obtainable by the paper-mills they would not be so keen on making arrangements, throughout India, to collect all the waste paper, however inferior its quality may be.

The probable annual receipts and expenditure for such an out-turn would be as follows:—

Receipts.

	Rupees.
By sale of 1,90,000 maunds of pulp, delivered at Dehra Dun Railway Station, at 3 rupees per maund	5,70,000

Expenditure.

Purchase of 5,70,000 maunds of spruce, at 11 annas per maund	3,91,875
Wear and tear of machinery and buildings, at 10 per cent. on 1,50,000 rupees	15,000
Manager's pay, at 800 rupees per month	9,600
Mechanical engineer's, at 450 rupees per month	5,400
3 Foremen, at 50 rupees each per month	1,800
3 Ditto at 30 rupees each per month	1,080
60 Workmen, at 6 rupees each per month	4,320
Carting 1,90,000 maunds of pulp to railway, at 3 annas per maund per 26 miles	35,625
Miscellaneous charges	5,300
Profit on capital of 5,00,000 rupees—*i.e.*, 20 per cent. per annum	1,00,000
	5,70,000

The capital required would be as follows:—

	Rupees.	Rupees.
Cost of machinery	80,000	1,50,000
Setting up, leading water, and erection of buildings ...	70,000	
Working capital		3,50,000
Total		5,00,000

This is the prospect which seems to await any capitalist enterprising enough to take up the business; and, if mechanically ground pulp is able to give such a profit, what would be the profit on chemically prepared wood fibre for paper and cloth? For, although it is somewhat more expensive to manufacture, the yield is as much as 60 to 66 per cent. of the weight of the wood against 33 per cent. of mechanically ground pulp. Doubtless Government would be prepared to meet any capitalist willing to start the business with an agreement to give him the first refusal *viâ* Dagpathar, at a certain rate for a certain number of years, as well as to lend him a plot of land for his factory with a right to lead water from the river to propel the machinery, so that he could make his own calculation as to whether it would pay him or not. Government at the same time would benefit by the opening out of a market for spruce, for which there is now no demand.

There should be no difficulty in getting water power sufficient to drive all the machinery required for the factory, as I believe the fall of the Tons River at the foot of the hills is about 45 feet per mile. Should a market for spruce be in this way developed, it would most probably pay the Forest Department to grow spruce on a rotation of thirty or forty years.

The Canadian pulp factories have bought up large areas of forest land which I am informed they are treating on a twenty-year rotation, but then the growth of American spruces, especially the Douglas spruce, is very rapid; *vide* the table published in *The Indian Forester* for May, 1899.

The trees in the plantation of spruce, near Deoban, in the Jaunsar Division made in 1874, when the plants were put out at one year old, now average 20 feet in height and 4·6 inches in diameter; but the plantation is not densely stocked, and the locality is one with an eastern aspect, while spruce does not

apparently grow thereabouts naturally. So it is expected that with a rotation of thirty or forty years, in places suited to the species, it would give a suitable sized tree for pulp purposes. When once a regular young forest was formed, the age at which the mean annual increment per acre culminated would be determined, and that age fixed for future rotations. It is very possible that, if experiments were made at the factory, it would be found that silver fir could also be utilised, in which case it would be advantageous to grow a mixed forest of spruce and silver fir.

It is indeed to be hoped that a market will soon be developed for spruce, as it is too heart-rending a sight to see all the grand trees now growing being absolutely wasted; and, as mentioned before, being girdled and allowed to rot wherever they interefere with deodar, even though the latter be seedlings a few years old.

Science.

THE ERADICATION OF THE PRICKLY PEAR.

For some time past the Department of Agriculture has been energetically pursuing investigations as to the best means of destroying the prickly year, and various experiments have been tried with varying success. Until recently, any hope of being able to deal with the pear pest in anything like a practical way was only pure speculation, and it was feared that the old method of uprooting and burning, or burying, was the only way to tackle it. Inventors (?) from all parts have laid claims to having found a specific, but each method, when put to the test, was found to present some features which rendered the process either ineffective or too complicated to admit of good practical results. Most of the claimants for specifics for the destruction of the pear, instead of demonstrating the efficacy of their special specific on a practical scale, merely desired to sell their so-called secret.

About six months ago, repeated experiments were made at the Westbrook State Farm by Mr. Kable, who, under the direction of the Department, proceeded thither and applied his reputed prickly pear destroyer, under the supervision of an official from the Department. At first, some of the experiments gave negative results, while others were partially successful. The plants were treated in various ways. One patch of pear, one chain square, was treated by means of cutting a number of leaves on each plant and inserting the chemical. A similar area was treated by making an incision in the main stock, near the root, and putting in the poison. Another area similar in size was treated by merely spraying the whole of the plants with the solution by means of a knapsack spray-pump, which delivered the liquid in the form of a fine spray, wetting the whole of the leaves. This latter mode of treatment has been proved to be the most satisfactory way of killing the plant, as it renders it quite unnecessary to puncture or bruise the leaves, and much time is thereby saved, while the death-dealing properties of the chemical are more potent.

In order to test the "prickly pear destroyer" on a larger scale, an agreement was entered into between the Department and Messrs. Kable and Adams, the latter to treat 100 acres of pear at Jondaryan. The area to be treated was selected by Mr. P. McLean, Under Secretary for Agriculture, who chose a block very thickly infested. Operations were commenced in the latter end of October, and up to the present time about forty acres have been treated. The result would appear to be satisfactory. At first some doubts were entertained as to whether seasonal conditions would retard the destruction of the

pear. The plants were all dormant at the time the work started, and it has been proved that when the sap is actively circulating the plant dies much quicker. The whole of the plants treated at Jondaryan are completely dried up and dead.

A couple of days after spraying, the leaves begin to turn mottled, the spots appearing irregularly over the surface. These continue to enlarge, merging into each other, until in about ten days the whole leaf presents a dirty-yellow colour. This colour is communicated to the stem and gradually extends to the root stock. In the case of very old plants with a thick woody stem, death is hastened by making an incision in the stem with a spud bar or other implement, and inserting about a teaspoonful of the liquid. In about twenty-one days from the time of treatment the plants are dead. The accompanying illustrations convey some idea of the method of treatment and the effect produced. No. 1 shows the workmen in the act of applying the destroyer by means of knapsack spray-pumps. No. 2, the tank in which the chemical is conveyed to the scene of operations; one of the spray-pumps is being filled from the tank by means of a rubber hose. No. 3, the workmen's tent, where the men are at lunch. No. 4 shows two plants of the pear that were growing side by side. The one on the left had been sprayed five days before this photograph was taken; all the leaves and stems have fallen down and present a pulpy yellow appearance, while the right-hand plant, which has not been sprayed, remains rigid, and is quite green. No. 5 gives a general idea of what prickly-pear infested country is like when overrun with this plant. In many places it is impossible to walk through without first beating down a track with a heavy stick or a crowbar; this has to be resorted to by the workmen when spraying heavy patches. No. 6 shows a large plant which has been killed. At the time this picture was taken, every leaf presented the appearance of pieces of cardboard, while the thick stems were rotten down to the roots.

Statistics.

QUEENSLAND PRODUCTS IN BRITISH MARKETS.

LATEST WHOLESALE PRICES.

BUTTER.—Choicest colonial, 98s. to 100s.; finest, 92s. to 96s.; choicest New Zealand, 98s. to 100s.; choicest Danish, 110s. to 112s. per cwt.

CHEESE.—New Zealand, 56s. to 57s. per cwt.; American, 57s. to 58s. Prices will inevitably advance owing to short supplies and increased consumption.

SUGAR.—£15 to £15 10s. per ton; Java, £12 5s. per ton; German beet, 88 per cent., 9s. 9d. to 10s. per cwt.

MOLASSES.—7s. to 10s. per cwt.; Queensland, none.

RICE.—Patna, 14s. to 24s.; Java, 14s. 6d. to 20s. per cwt.

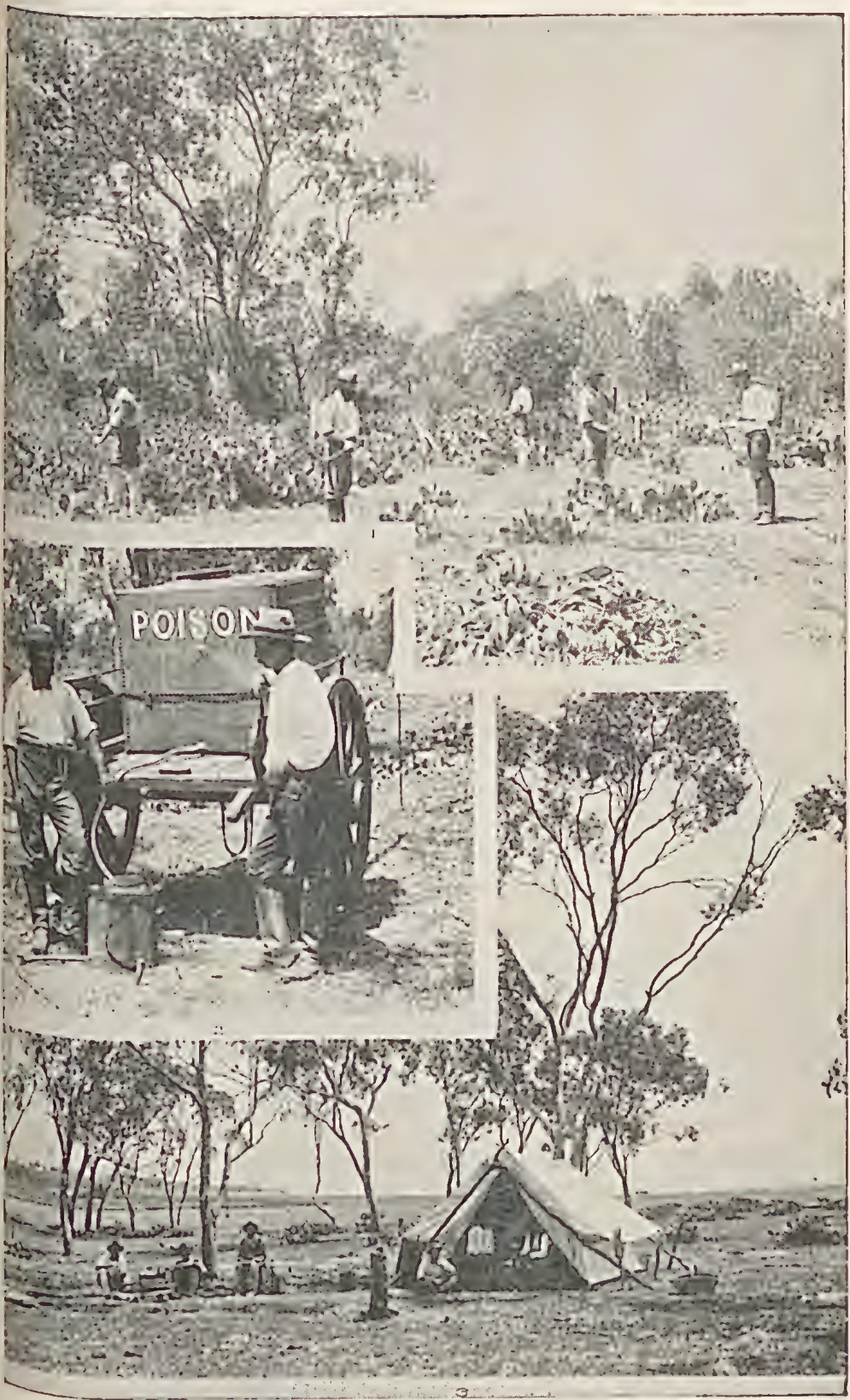
COFFEE.—Finest Coorg peaberry, 65s. to 124s. per cwt.; Ceylon plantation, 115s. to 120s. per cwt.; bold blue, 86s. to 97s.; Santos, 40s. to 52s. 6d.; Maragopipe, 75s. to 86s.

ARROWROOT.—7½d. to 2s. per lb.; Bermuda, 2s. per lb. Dull of sale.

WHEAT.—28s. 6d. to 30s. per quarter; 3s. 7d. to 3s. 9d. per bushel. Quiet sales at full prices.

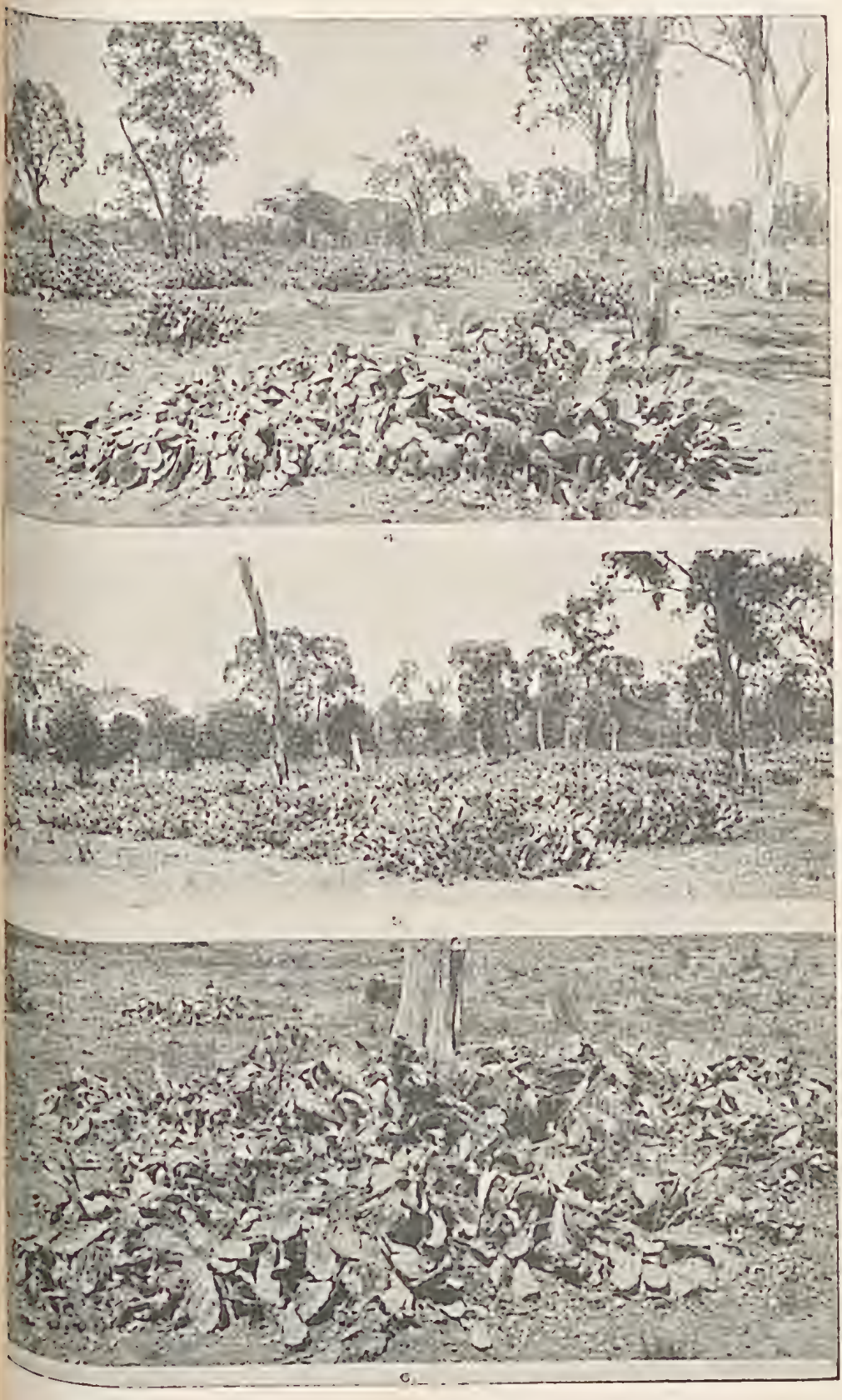
GINGER.—Calicut, rough, 32s. per cwt. Jamaica: Finest, 110s. to 140s.; fair, 58s. to 60s.; fine, 90s. to 100s. per cwt.

Plate CXCI.



PRICKLY PEAR EXPERIMENTS AT JONDARYAN

Plate CXCII.



PRICKLY PEAR EXPERIMENTS AT JONDARYAN.

Tobacco.—Prices for pipe tobacco on 1st February, 1900—Pipe tobacco:—Kentucky Leaf: Common to fair, 2½d. to 5½d.; coloury, good to fine, 7d. to 9d. Kentucky Strips: Common to good, 3½d. to 7½d.; fine, 8d. to 11d. Virginia Leaf: Common to fair, 2½d. to 6d.; coloury, good to fine, 8d. to 11d. Virginia Strips: Common to good, 4d. to 8d.; fine, 8d. to 12d. Cigar—Sumatra, 7d. to 5s.; Manila, 4d. to 4s.; Havana, 8d. to 5s.

Wine.—Fair red wine (Australian claret type) in bond, 2s. to 2s. 6d. per gallon; fine old quality, 4s. 6d. per gallon; ordinary London port, £10 per pipe of 110 gallons; Marsala, £12 per pipe of 96 gallons.

Green Fruit.—Apples, 14s. to 28s. per barrel. Pears, 8s. to 12s. per case. Pineapples, 1s. 6d. to 4s. 6d. each. Oranges: 7s. 6d.; selected, 11s. 6d. to 17s. 6d.; others, 18s. to 25s. per box; prices advancing. Grapes (Almeria): 18s. to 24s. per barrel; English, 2s. per lb.

Eggs.—Australian, 9s. 6d. to 10s. per 120; Irish, 11s. to 12s. per 120; Danish, none offering, 11s. 6d. to 13s. per 120.

Honey.—British, 40s. per cwt.; colonial, 30s. per cwt.

Olive Oil.—£36 to £36 10s. per tun (252 gallons).

Timber.—Kauri pine is selling steadily at late rates. Fair business in cedar logs. General advance in values, except for New Zealand white pine, which is in moderate demand.

Sisal Hemp.—£18 to £30 per ton.

Wool.—The New Zealand Loan and Mercantile Agency Company report to March 15:—The sales progress firmly. The American demand has increased. Crossbred market firmer. For superior greasy merino the prices are now on a level with closing rates of last sales.

Frozen Meat.—The latest quotations to the 17th February for the various descriptions of frozen meat are:—New Zealand mutton (crossbred wethers and maiden ewes): Canterbury, $3\frac{3}{8}$d.; Dunedin and Southland, $3\frac{5}{16}$d.; North Island, $3\frac{1}{4}$d. Australian mutton (crossbred and merino wethers): Heavy (over 50 lb.), $3\frac{1}{16}$d.; light (under 50 lb.), $3\frac{1}{4}$d. River Plate mutton (crossbred and merino wethers): Heavy, $3\frac{1}{8}$d.; light, $3\frac{3}{8}$d. New Zealand lambs: Prime Canterbury (32 lb. to 42 lb.), $5\frac{1}{8}$d.; fair average, $4\frac{7}{8}$d. Australian lambs: Prime, 4d.; fair average, $3\frac{1}{2}$d. Australian frozen beef: Prime ox, forequarters, 3d.; prime ox, hindquarters, $3\frac{5}{16}$d.; secondary, forequarters, $2\frac{7}{8}$d.; secondary, hindquarters, $3\frac{3}{16}$d. The above prices are the official quotations furnished by the Frozen Meat Trade Association. The basis of quotations is sales of lines of not less than 100 carcasses of mutton or lamb, or 25 quarters of beef. All the quotations for mutton are for average quality. Quotations for New Zealand and Australian lambs do not include sales of small lambs, or heavies, or inferior quality.

Bacon.—47s. to 56s. per cwt.

Hams.—40s. to 45s. per cwt. Irish (smoked): Special brands, 80s. to 90s.; fine, 74s. to 86s.

Hides.—Queensland bullock, heavy ($52\frac{5}{8}$ lb.), $5\frac{3}{4}$ per lb.; light ($47\frac{3}{8}$ lb.), $5\frac{3}{4}$d.; cow ($41\frac{3}{8}$ lb.), $5\frac{3}{8}$d.; New South Wales light bullock, $5\frac{1}{2}$d. per lb.; horse, 7s. to 9s. each. Sales on 15th March show an advance of 1d. per lb. on heavy and light bullocks, and $\frac{7}{8}$d. per lb. on cow hides.

Skins.—Sheep, an advance of 4d. to 5d. per lb. on merino and fine crossbreds, and 3d. to 4d. per lb. on the coarser descriptions; lamb, from 1s. to 5s. each.

Furred Skins.—*Kangaroo*, 11d. to 1s. 3d. per lb. *Opossum*, 5s. to 5s. 6d. per dozen, with a gradual decline on last month's quotations; 5 to 10 per cent. lower for first blue fine and first red good to fine. *Wallaby*, 11d. to 1s. 3d. per lb.; prices have risen by 15 per cent *Bear*, 7d. to $9\frac{3}{4}$d. each; prices higher by 15 to 20 per cent.

TALLOW.—On 15th March, mutton tallow, fine, brought 31s. per cwt.; medium, 29s. 6d; beef, fine, 28s. 6d. to 30s.; medium, 26s. per cwt.

HORNS.—Extra large, 52s. to 60s.; large, 40s. to 47s. 6d.; medium, 25s. to 35s.; small, 12s. 6d. to 20s. per 100.

BONES.—Shanks, round, £5 to £5 10s.; flat, £3 10s. to £3 15s.; mixed, £3 5s. to £3 15s. per ton.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

AMONGST the several factors which have to be taken into consideration when looking for a farm location, next to good soil, the selector will do well to study the rainfall of the district in which he proposes to settle. With the view of assisting them in this very important matter, we requested Mr. Clement L. Wragge, Government Meteorologist, to furnish us with the total monthly rainfall in each agricultural district for the past year (1899). This he has very courteously done, and he will also supply the rainfall during every month of the current year for publication in the *Journal*. The table in this issue is so simply and clearly arranged that the total rainfall in any agricultural district for any given month can be seen at a glance.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1899.												1900.
	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.
North.													
Bowen	9·68	14·90	8·61	9·16	1·46	Nil	0·63	0·21	0·06	0·56	Nil	2·92	7·61
Cairns	13·63	10·97	35·46	12·97	4·03	0·63	2·01	1·31	3·23	0·74	0·33	4·57	43·06
Geraldton	10·03	19·19	41·28	40·65	12·61	1·61	8·93	2·85	9·03	1·03	Nil	4·89	62·26
Herberton	8·19	4·93	21·32	6·71	1·49	0·66	0·23	0·36	1·62	0·18	2·75	0·73	11·90
Hughenden	3·78	1·60	2·99	0·10	0·01	0·20	0·46	2·05	Nil	0·45	1·05	0·33	6·43
Longreach	1·60	2·20	4·05	0·54	0·58	0·60	1·08	0·28	0·06	0·27	0·67	Nil	1·68
Lucinda	6·96	20·96	20·05	14·00	1·71	0·40	2·78	0·80	0·97	0·02	1·26	1·02	37·35
Mackay	11·32	9·69	18·65	9·19	4·71	Nil	2·29	2·37	1·33	0·19	0·49	7·65	20·86
Rockhampton	17·18	9·88	3·59	1·42	2·49	0·40	2·23	1·71	1·96	2·35	1·22	11·02	4·53
Townsville	10·19	10·69	10·93	3·76	0·59	Nil	0·78	0·89	0·01	0·35	0·16	0·53	21·09
South.													
Barcaldine	2·11	2·69	2·33	1·17	0·39	0·05	1·03	0·53	0·27	0·94	0·52	0·04	3·08
Beenleigh	6·15	2·32	0·76	4·26	3·06	5·70	6·96	2·02	3·11	2·53	1·80	7·40	5·42
Blackall	2·75	3·19	2·74	0·18	0·13	0·20	1·11	0·57	0·16	1·20	0·04	0·85	1·73
Brisbane	7·32	2·10	0·71	3·32	1·54	2·75	3·50	1·43	2·48	2·26	2·33	7·61	6·51
Bundaberg	11·31	7·26	3·76	4·13	2·92	1·42	2·33	2·62	1·67	1·60	0·06	7·62	4·63
Caboolture	6·15	2·66	1·10	3·85	2·06	2·67	4·61	1·90	2·40	2·30	2·23	7·41	3·01
Charleville	1·58	1·20	0·51	0·52	0·06	0·25	0·33	1·26	0·55	0·36	0·43	0·16	1·01
Dalby	6·72	1·94	0·57	2·79	1·20	1·33	1·67	1·09	1·20	1·44	1·84	2·89	0·41
Emerald	7·05	2·99	3·00	2·60	2·13	0·03	1·31	2·08	1·96	1·93	1·32	0·40	3·08
Esk	4·55	1·57	0·94	4·11	1·89	2·40	2·59	1·69	2·79	2·67	2·25	5·34	1·42
Gatton	4·66	1·93	0·21	3·32	1·33	1·18	2·01	1·55	2·19	2·13	3·50	5·87	2·40
Gayndah	7·44	1·45	1·01	1·45	1·26	1·30	0·86	3·34	1·24	2·73	4·59	7·37	2·52
Gympie	5·78	2·42	2·88	4·01	2·89	3·57	2·26	1·23	2·11	2·41	0·39	6·44	5·57
Ipswich	5·57	1·24	0·24	4·11	1·41	1·82	2·42	1·29	2·77	2·04	3·46	4·66	2·79
Laidley	6·93	2·35	0·54	3·66	1·63	1·32	2·00	1·82	5·04	3·17	2·40	6·50	0·64
Maryborough	8·04	5·87	5·91	4·59	3·35	4·20	1·71	1·19	2·29	1·20	0·51	4·13	4·88
Nambour	9·36	6·26	6·87	5·32	3·79	6·17	4·18	1·81	3·13	2·87	3·03	11·11	4·07
Nerang	8·64	3·44	1·92	5·36	2·28	3·34	9·80	2·52	4·74	1·99	1·42	6·31	4·60
Roma	3·18	3·28	0·63	1·70	0·26	0·53	1·05	1·00	0·55	0·35	1·27	0·99	0·43
Stanthorpe	6·09	2·88	0·43	2·53	1·20	1·36	3·11	1·08	1·63	1·36	0·86	3·22	2·62
Taroom	7·12	2·01	2·89	3·52	1·35	0·61	1·27	1·60	1·55	0·83	3·32	0·65	1·78
Tambo	1·73	2·81	1·52	0·52	0·15	0·60	1·16	0·74	0·27	0·79	0·08	0·66	2·23
Tewantin	7·02	10·08	7·36	8·66	6·87	9·28	5·00	3·67	2·80	3·36	0·46	8·22	1·69
Texas	8·23	3·52	0·13	2·37	0·50	3·26	2·95	1·38	1·72	0·97	0·74	2·67	1·56
Toowoomba	5·97	2·10	0·80	3·68	1·33	2·11	1·75	1·63	3·15	1·43	2·36	4·75	1·01
Warwick	6·07	3·19	1·16	4·13	1·03	1·53	2·44	1·00	1·99	2·48	1·67	3·83	1·84

General Notes.

BROOM-MAKING.

Our illustration (Fig. I.) shows a cylinder broom corn scraper. It is operated by a rotary toothed cylinder through its multiplying gearing, by either hand or other power, and is used for cleaning broom corn brush of seed. A still more simple contrivance than the cylinder is, and has been, used in Egypt from time immemorial, called the "ripping comb." Fig. II. shows a machine for winding corn brush, and tying it with a cord or wire preparatory to flattening it in the

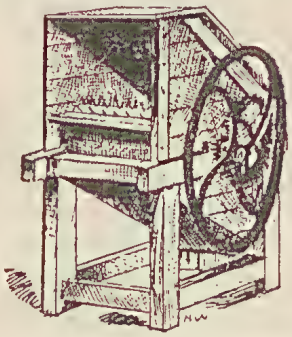


FIGURE 1.—CYLINDER BROOM-CORN SCRAPER

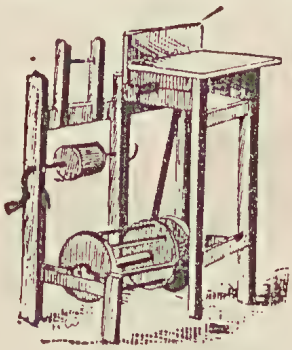


FIG 2.—BROOM WINDER.

FIG. 3.—BROOM VYCE

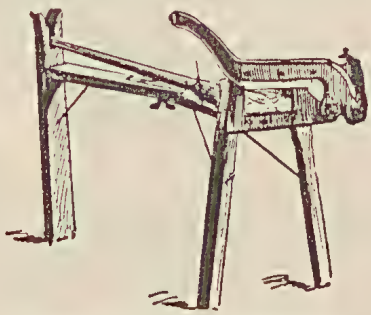


FIGURE 4.—BROOM TRIMMER.

vyce and sewing. Fig. III. shows a broom vyce, and is merely a clamp in which the round bunch is flattened and held while being sewn. They are made to work either with levers or with screws. Fig. IV. is a broom trimmer, which is a rack with a level-slotted aperture on the end of the rear post, which surmounts the table, and holds the broom with the assistance of the adjustable clamp on the table while the pivoted knife trims it off.—*Town and Country Journal.*

FOOD SUPPLIES FROM AUSTRALIA.

THE *Scottish Farmer* says that Australia seems likely to be a formidable source of food supplies for this country during 1900. It is expected that she will send us 24,000,000 bushels of wheat, and Victoria alone means to send us 30,000,000 lb. of butter. The texture and mildness of Australia cheese are spoken of as causes of its popularity amongst all classes of the community, and there is likely to be plenty of demand for this cheese, as existing stocks of English cheese are reported short. So far as Scots cheese is concerned, *The Grocer* expects that the price will advance early in the year, and nobody will be sorry. In spite of all the efforts of the factories, the same authority declares that farmers' produce in cheese maintains its own position, and this is reassuring, in view of all that has been advanced. Truth to tell, the farmers who in these days get poor prices for their cheese have themselves to blame. The means for improving the quality are at their hands, and they have no excuse if they persist in producing an inferior article.

BUTTONS MADE OF MILK.

THOSE creamy-looking white buttons which you see street hawkers in London offering you at twelve for a penny, one of which you may wear on your shirt collar, are made of milk. The milk is that which has become sour at the large dairies. It is sent to three large manufactories in the East End of London, and there churned very much after the manner of making cheese, into buttons.

This cheese is then put under enormous pressure until every drop of moisture is wrung from it, when it is passed into a chemically heated room. It is then, while under great heat, bleached white and flattened out, ready to be punched into the required shapes.

It is found that buttons can be made in this way at less than half the cost entailed in manufacturing bone ones, and, besides never rubbing away, do not turn their colour.

DESTRUCTION OF RATS.

Mr. P. R. GORDON, Chief Inspector of Stock, gives the following simple method which, according to American papers, has been most successful in clearing rats off premises where previously they had defied the presence of from twenty to thirty cats:—Get a few small pieces of shingles or thin boards. On each of these put a teaspoonful of molasses, and over this scrape a small amount of condensed lye, and lay the boards or shingles around the rat holes, or wherever their runs are. The molasses will draw them, and the lye will eat out the coating of their stomachs. Four days are given as the time when the rats will have been cleared out. From the fact that this mode of destruction has appeared, at intervals, in many well-conducted journals in the States, for months past, Mr. Gordon is induced to think it is well worth a trial here. The recipe is simple, cheap, and easy to carry into effect.

KILLING AND CURING MEATS.

WE have given from time to time receipts for curing meat, which we knew to be good. But there is always one way a little better than another, and we were impressed with the following contributed to the *Times Union and Citizen* by J. Burdett, of Marion county:—

To Cure Bacon or Corn Beef.—For every 100 lb. of meat take 6 gallons of water, 3 lb. of brown sugar, 9 lb. of pure salt (rock or solar salt is safest), 1 quart of good molasses, 3 oz. of saltpetre, 1 oz. of soda. Boil water and salt first, and then add the other ingredients, and skim off all the impurities. Pack pork in a good barrel as well as possible, and when the brine is cool pour it over so as to cover the meat entirely and weight it down to keep it from the air. After three or four weeks it can be smoked and then packed in a barrel with clean wood ashes to keep out all insects.

The above receipt makes a fine sugar-cured ham, and good breakfast bacon, and the beauty of it is that you do not have to salt your meat down, but first put it in the pickle as soon as the meat can be cut up and the animal heat gotten out of it. If a cold night or two should come, the pieces are much improved by being removed from the barrel, and left all night exposed to the air.

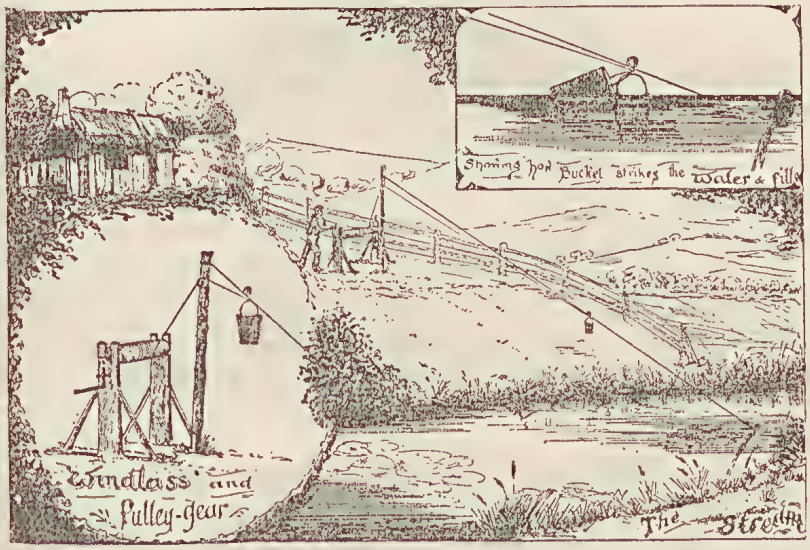
The receipt is equally good for corning beef; only you should dip each piece of the beef into the brine while it is boiling for three or four seconds, and then proceed as with the pork.

Home-cured hams are helped wonderfully by adding to the brine a cup of sugar and a little mustard.

Be very particular in making the above brine not to use western salt, which was clarified with lime, New York salt, clarified with blood, for Turk's Island or Liverpool salt is better.—*Pacific Rural Press.*

WINDLASS AND BUCKET IRRIGATION.

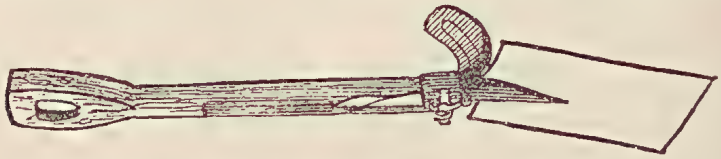
The accompanying illustration shows a very simple and economical method of raising water from a river, creek, or lagoon, for irrigation or other purposes, and which is now in practice on many of the farms and stations of the interior of New South Wales and other Australian colonies. The plan is to stretch a small wire rope from a post on the bank of the stream to a post driven in the bed of the stream, as shown in the central figure of our illustration. On the rope is placed an ordinary runner, or small block, to which is made fast a bucket or oil drum. To the runner is then made fast a small rope, which is rove through a leading block on the upright post on the bank, and taken to the barrel on the windlass. The whole appliance is now complete. The bucket will run down the standing rope by its own gravity, and will dip in the water as shown in the



right-hand figure of the engraving. When full, it is hoisted up as shown in the central figure, until it reaches a sufficient height to be reached from the bank by the operator, as seen in the left-hand corner figure. We know of several people in the country who hoisted sufficient water by this method to keep their trees going during the hot weather of last year. Of course only small buckets are used by this plan, as large vessels, such as casks, would sag the rope so much when in the middle that it would be impossible to land them on the bank, but a couple of boys with an oil drum can raise a large quantity of water in a day by the device shown, and it has the advantage of being cheap and easily rigged.—*Town and Country Journal.*

A SPADE ATTACHMENT.

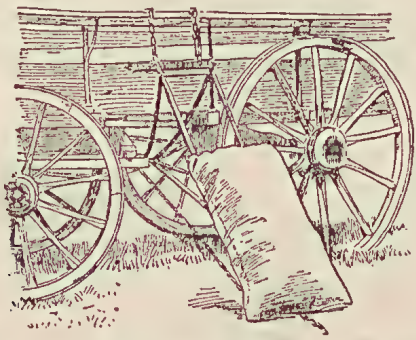
OUR illustration shows a simple device for spades, known as the Hardy spade attachment, which will lighten work considerably. The greatest strain in using a spade is on the muscles of the back. The patent appliance illustrated reduces the labour to a minimum through the change of position of the fulcrum and the better disposition of the point of leverage. The strain is



thus very considerably modified. The appliance can be attached and detached at will, so that it may be used with a series of different spades. In digging with its aid the spade is made to raise its load automatically to the level of the digger, and he merely has to empty his spade and continue digging without excessive muscular exertion.—*Leader.*

WHEAT BAG LIFTER.

MR JOHN KNIGHT, of St. Mary's, Lake Bolac, favours *The Leader* with the following particulars, which accompanied the photo. reproduced on this page:—"I am sending you a photo. of what I consider a most important labour-saving implement. It is a bag lifter, and was sent to me by a friend, who is one of the



largest wheatgrowers in the mallee. The ease, speed, and efficiency of this simple-looking machine can only be realised when it is seen at work. It is easily attached and easily removed. To work it you hook a horse to the chain, and when he moves about three paces the bag is lifted. We have loaded 36 bags in 4¾ minutes by means of this fixture."—*Sydney Mail.*

A SIMPLE METHOD FOR THAWING DYNAMITE.

THE Oregon Agricultural College and Experiment Station (says the *Pacific Rural Press*) has been doing some work recently in the blasting of soils with dynamite for the purpose of determining its effects upon the growth of fruit trees, and to ascertain if it can be practically employed as a substitute for sub-soiling. In using this explosive they find that it freezes in a temperature of about 52 degrees Fahr.; hence at this season of the year, when kept in an ordinary building without artificial heat, it remains in a frozen condition. They were at first not a little concerned as to a safe method of thawing it for use, but, acting upon a suggestion to bury it for a short while in fermenting horse manure, soon dispelled the spectre of a premature explosion which occasionally occurs during the process of thawing. This method so far has been quite satisfactory. The plan is to bury the frozen dynamite in a pile of heated horse

manure for an hour before the time to use it. They recommend this plan of thawing this explosive with the fullest confidence that its general adoption wherever practical will remove an element of danger in its use.

THE OIL INDUSTRY IN VICTORIA.

It has been found by the producers of colza, linseed, and sunflower oils in the southern colony that these products, to be readily saleable, must be put up in ordinary oil drums instead of in tins. A consignment of seed from the Bairnsdale district was turned into oil in Melbourne, put up in kerosene tins and cases, and placed for sale in the hands of Messrs. Dalgety and Co. The latter complain that, having canvassed all the dealers in town, they are unable to sell any of the colza, linseed, or sunflower oils, owing to their having been stored in tins, instead of the ordinary oil drums. If this mistake had not been made, the oil would be saleable at 2s. 6d. to 2s. 9d. per gallon.

The cost of putting up the oil to the grower was 6d. per gallon. In order to sell it, it had to be repacked in 5-gallon drums at a further cost of $2\frac{2}{5}$d. per gallon. The total charges made at the mill for treating the seed amount to about 1s. 1d. per gallon; and as it is only saleable at 2s. 6d. to 2s. 9d. per gallon, the effect of this is easily imagined. In any case the cost of treatment would absorb the bonus.

COMPRESSED HAY.

The baled hay that is being shipped from New York for the use of the British army in South Africa and the American army in the Philippines is being compressed by a new process. The hay is put up in bales cylindrical in form, about the size and shape of the old-fashioned nail keg, or 18 inches high and of the same diameter. When baled in this shape, the hay is as hard as a board. The bales weigh about 145 lb.

The most compact bale of hay put up by the old style requires but 160 cubic feet space per ton. This new-fangled hay takes up only 50 cubic feet space per ton.

The good thing about this new bale is that a mule can carry two 112-lb. bales, and after he is fed off them for two or three days there is enough left for a cavalry man to use as a miniature rampart. The hay is packed so tight that a bullet would not go far into it.

RECIPE FOR DRIED APPLE JAM FOR RABBIT-POISONING.

The following recipe has been used by Mr. P. Howard, manager of Tyrrell Downs Estate, Victoria, with great success:—4 lb. dried apples; 1 lb. sugar; add sufficient water to keep them boiling as required until they are boiled to a pulp, when they will weigh about 16 lb. Mix well by stirring. One ounce strychnine is sufficient for this quantity. In laying the poison put about as much as would rest on a shilling piece on bits of fresh bark of willow, dogwood, or pine.

A USEFUL JOINT FOR THE ECONOMICAL HOUSEKEEPER.

A HAND OF PORK AND WHAT TO DO WITH IT.

This is a most economical joint to buy, as every scrap can be utilised, and from it a really delicious dish provided. See that it is neatly cut, and, unless much liked by some member of the family, buy it without the trotter. Skin it and then remove the bone. Prepare a forcemeat, as for veal, of 3 oz. bread (crust or crumb), 1 oz. suet, or a little melted dripping, grated lemon rind, mixed sweet herbs (parsley, thyme, and marjoram) to taste, and season lightly with pepper, salt, and ground mace. If you use crusts of bread, soak them until soft in a little milk and water, squeeze very dry, and mash very finely with a fork. Stuff the hand with this, sew up neatly, and make it into a nice shapely form. Lay it in a stew jar with a little milk and water, and cook gently in a

moderate oven, keeping it well basted with the liquid and closely covered. Turn it over now and then. It will take from three to four hours. Very little milk should be used, as the meat always curdles it; still, use a little, as it greatly improves the flavour of the pork. When ready place it on a hot dish, remove the string, and pour over it a good white sauce nicely seasoned and flavoured. You will be surprised at the delicacy of the pork, which seems to be chicken or veal rather than pork.

The remains can be cut up and rewarmed in the sauce, or made into a curry or Cornish pasties.

The bone broken up and stewed slowly with cold water and a pinch of salt or sugar makes an excellent stock for vegetable soups, such as peas, haricot beans, and lentil soups, all of which are improved by the addition of a rich, greasy stock, such as pork, ham, or bacon bones produce. The skin should be cut up and rendered down in a cool oven. When the fat is all extracted, strain it off, and it will be as good as lard. The "scraps" still contain some fat and make a good breakfast dish with a mustard sauce, and can be eaten hot or cold. The liquor in which the pork was stewed is not to be despised. It is excellent made hot and poured over hot potatoes for supper, or well-soaked haricot beans may be added to it and slowly cooked until the beans are quite tender and yet not broken. Season at the last moment, as salt hardens beans and so prolongs the cooking.

A NEW GERM-DESTROYER.

A CORRESPONDENT of the *Ceylon Observer* comments upon a new germicide, saying:—Ozone when passed into water is found to kill the micro-organisms. This discovery has been made in Lille, where the water is notoriously bad, by two French gentlemen. They are taking steps to purify the water supply of that town. Ozone is another form of oxygen which is common in the air after an electrical discharge of lightning, and it is manufactured by a current of electricity being passed through air. It has been already found that heat alone up to the boiling point has not been an efficient germ-destroyer, so that this discovery will be welcomed by the medical profession. This discovery is one step nearer to that landmark of civilisation to which Pasteur called attention. The first step is civilisation man made when he drove the wild animals from his cities, the next will be when he has banished all germs.

THE VINTAGE IN SOUTH AUSTRALIA.

THERE is, unhappily, a very poor vintage prospect this year in some of the more important districts. Even where frosts have not proved a scourge to the vigneron, the dry weather has done a great deal of harm. In those centres where most damage was done by frost, the yields are in many cases so poor as to be hardly worth mentioning. At Yalumba, for instance, the crop in the home vineyard will probably not reach five tons, and Smith and Sons have, in brighter years, had 60 tons from the same area. From all over the Angaston and Tanunda districts come very much the same deplorable accounts, and vine-growers deserve all sympathy in their trials. The one small bright spot in the picture is the fact that winemakers are paying largely enhanced prices for grapes. Mataro is fetching £3 a ton, and no one needs to be told that at this price the business pays the grower if the crop is a good one. There is no reason to doubt that it pays the maker also; and as the shortage of grapes has had little to do with the increased prices, they will probably stand at least as high next year. The fact is that winemakers' stocks are getting dangerously low, especially in view of the expansion in business which Federation is expected to bring about. Therefore, it behoved the makers to encourage the growers to extend their vineyards, and better prices are already having this effect. Prices of the better varieties of grapes have not been raised to the same extent, and some of them not at all, but, as the bulk of the vines in South Australia are the cheaper and heavier-bearing kinds, the rise has affected nearly everyone. That being so, the despondency one would look for in consequence of the poorness of the

season is not nearly so general as might be thought. The South Australian tiller of the soil is an optimistic gentleman, always looking ahead for better times, and thus grapegrowers are quite cheerful, and anticipate a good vintage and high prices next year. It is, perhaps, just as well he is built that way. We are told that "anticipation is better than realisation"; and, if this is so, vignerons are indeed well off. They have lately had plenty of anticipation, and precious little realisation.—*Garden and Field.*

TO TEACH A HORSE TO BACK.

A simple and very convenient method of teaching a young horse to "back" (writes the *Cable*) is to place the fingers between the point of the shoulder and the breast-bone, and then apply a little pressure. Any force applied in this manner will be found to cause the animal to step back immediately. If in the act of causing the animal to recede in this manner the word "back" is constantly used, it will very soon come to associate the use of the word with a retrograde movement, and will act accordingly.

TO TEST EGGS ON THE FOURTH DAY.

This may be done by cutting a hole in a kerosene tin to hold a glassful of water opposite the lamp that you put inside the tin. You will see the germs floating by turning the egg held between the finger and thumb; in fact, it may be seen on second night. Warm an old teapot cosy (or a new one, if your wife is not about), and bring the eggs to a warm room where your light is ready, and it can be done any time of the year without risk. The advantage of this is, the clear eggs are fit for pastry.

MANURIAL VALUE OF URINE.

The urine of cattle contains on the average a little over one-half of 1 per cent. of nitrogen and somewhat less of potash. The urine of sheep contains over 2 per cent. of nitrogen and 2¼ per cent. of potash. But little of the phosphoric acid contained in animal food is passed in the urine. Sheep pass a greater portion of the potash in their urine than other animals. The grass is helped chiefly by the nitrogen and partly by the potash. A ton of cattle urine contains 10 lb. of nitrogen and 8 lb. of potash. Nitrate of soda is the most soluble form of nitrogen, and with potash will give almost as good results on grass as the urine. If you dissolve 10 lb. of nitrate of soda and 6 lb. of muriate of potash in a 40-gallon barrel of water, you have a mixture nearly equal to a barrel of urine.—*Exchange.*

SOME USEFUL MEASUREMENTS.

For estimating the areas of paddocks and cultivated plots, the following figures will be found useful:—

60	feet by	726	feet	...	...	...	1 acre
110	„	396	„	...	...	...	1 „
129	„	363	„	...	...	...	1 „
220	„	198	„	...	...	...	1 „
240	„	181½	„	...	...	...	1 „
440	„	99	„	...	...	...	1 „
5	yards by	968	yards	...	...	...	1 „
10	„	485	„	...	...	...	1 „
20	„	242	„	...	...	...	1 „
40	„	121	„	...	...	...	1 „
70	„	69½	„	...	...	...	1 „
80	„	60½	„	...	...	...	1 „

A British halfpenny measures exactly 1 inch in diameter. Laid on a map drawn to a 1-inch scale it will just cover 500 acres.

SIZES OF BOXES OF DIFFERENT MEASURES.

A box	24	inches	long	by	16	inches	wide	and	28	inches	deep	will	contain	3 bushels
,,	24	,,	,,	,,	16	,,	,,	,,	14	,,	,,	,,	,,	1½ ,,
,,	16	,,	,,	,,	16	,,	,,	,,	8⅖	,,	,,	,,	,,	1 ,,
,,	16	,,	,,	,,	8⅖	,,	,,	,,	8	,,	,,	,,	,,	½ ,,
,,	8	,,	,,	,,	8⅖	,,	,,	,,	8	,,	,,	,,	,,	1 peck
,,	8	,,	,,	,,	8	,,	,,	,,	4⅕	,,	,,	,,	,,	1 gallon
,,	7	,,	,,	,,	4	,,	,,	,,	4⅕	,,	,,	,,	,,	½ ,,
,,	4	,,	,,	,,	4	,,	,,	,,	4⅕	,,	,,	,,	,,	1 quart.

CAPACITY OF TANKS.

CIRCULAR TANK ONE FOOT IN DEPTH.

	Gallons.
5 feet in diameter holds	142
6 ,, ,, ...	215
7 ,, ,, ...	283½
8 ,, ,, ...	378
9 ,, ,, ...	472½
10 ,, ,, ...	582¾

CUBING TIMBER.

To measure square timber: Multiply the length, width, and thickness together, and divide the product by 12.

How many square feet in a joist 2 × 8, 18 feet long?

2 × 8 × 18 = 288 ÷ 12 = 24 feet. Ans.

DISTANCES TRAVELLED IN PLOUGHING.

Width of Furrow.	Ploughing One Acre.
7 inches	14½ miles
8 ,, ...	12¼ ,,
9 ,, ...	11 ,,
10 ,, ...	9½ ,,
11 ,, ...	9 ,,
12 ,, ...	8¼ ,,
13 ,, ...	7½ ,,
14 ,, ...	7 ,,
15 ,, ...	6½ ,,
16 ,, ...	6½ ,,

NUMBER OF TREES ON AN ACRE.

4 feet apart ...	2,720	15 feet apart ...	200
5 ,, ,, ...	1,749	18 ,, ,, ...	135
6 ,, ,, ...	1,200	20 ,, ,, ...	110
8 ,, ,, ...	689	22 ,, ,, ...	70
10 ,, ,, ...	430	30 ,, ,, ...	50
12 ,, ,, ...	325		

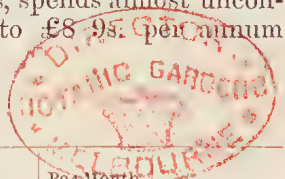
PER CENTAGES.

	s.	d.			s.	d.	
2½ per cent. is	0	6	in a pound	17½ per cent. is	3	6	in a pound
5 ,,	1	0	,,	20 ,,	4	0	,,
7½ ,,	1	6	,,	22½ ,,	4	6	,,
10 ,,	2	0	,,	25½ ,,	5	1⅗	,,
12½	2	6	,,	30 ,,	6	0	,,
15 ,,	3	0	,,	35 ,,	7	0	,,

TIME AT WHICH MONEY DOUBLES AT INTEREST.

Money invested at 5 per cent. simple interest will double itself in 20 years. Thus, if a man puts by 2s. per week, at the end of the year he has saved £5 4s. The interest on this amounts to a little over 5s. 2d., so that at the end of 20 years at 5 per cent. simple interest he will have £10 8s.

Money invested at 5 per cent. compound interest doubles itself in 14 years 75 days, and at 10 per cent. in 7 years 100 days. The above is worth noting, because 3 per. cent. compound interest is paid at the Government Savings Bank, and £5 4s. a year paid in for 23½ years will be doubled in that time. Now, how many of us squander a good deal more than £5 a year on what are really needless luxuries. The man who smokes regularly, and at the end of the day's work has a glass or two of ale or spirits, spends almost unconsciously from 2s. 6d. to 3s. 3d. a week, or from £6 10s. to £8 9s. per annum of his capital, besides losing the annual interest.



EXPENSES TABLE.

Per Day.	Per Week.	Per Month, 4 weeks.	Per Year.	Per Day.	Per Week.	Per Month, 4 weeks.	Per Year.
£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
0 0 1	is 0 0 7	0 2 4	1 10 5	0 6 0	is 2 2 0	8 8 0	109 10 0
0 0 2	,, 0 1 2	0 4 8	3 0 10	0 7 0	,, 2 9 0	9 16 0	127 15 0
0 0 3	,, 0 1 9	0 7 0	4 11 3	0 8 0	,, 2 16 0	11 4 0	146 0 0
0 0 4	,, 0 2 4	0 9 4	6 1 8	0 9 0	,, 3 3 0	12 12 0	164 5 0
0 0 5	,, 0 2 11	0 11 8	7 12 1	0 10 0	,, 3 10 0	14 0 0	182 10 0
0 0 6	,, 0 3 6	0 14 0	9 2 6	0 11 0	,, 3 17 0	15 8 0	200 15 0
0 0 7	,, 0 4 1	0 16 4	10 12 11	0 12 0	,, 4 4 0	16 16 0	219 0 0
0 0 8	,, 0 4 8	0 18 8	12 3 4	0 13 0	,, 4 11 0	18 4 0	237 5 0
0 0 9	,, 0 5 3	1 1 0	13 13 9	0 14 0	,, 4 18 0	19 12 0	255 10 0
0 0 10	,, 0 5 10	1 3 4	15 4 2	0 15 0	,, 5 5 0	21 0 0	273 15 0
0 0 11	,, 0 6 5	1 5 8	16 14 7	0 16 0	,, 5 12 0	22 8 0	292 0 0
0 1 0	,, 0 7 0	1 8 0	18 8 0	0 17 0	,, 5 19 0	23 16 0	310 5 0
0 2 0	,, 0 14 0	2 16 4	36 10 0	0 18 0	,, 6 6 0	25 4 0	328 10 0
0 3 0	,, 1 1 0	4 4 0	54 15 0	0 19 0	,, 6 13 0	26 12 0	346 15 0
0 4 0	,, 1 8 0	5 12 0	73 0 0	1 0 0	,, 7 0 0	28 0 0	365 0 0
0 5 0	,, 1 15 0	7 0 0	91 5 0				

TO BANISH FLIES.

Flies are a great nuisance in summer time around the house. They are a greater nuisance when the barn is filthy, or if it is too near the house. Where it is desired to get rid of flies, the following is recommended:—One part of benzoin and one of balsam tolu, five parts of charcoal, one and a-half of common insect powder, and one-half part of saltpetre; add sufficient water to knead a stiff paste. Roll into pasteles and dry them. One will burn for some time in a room, and the fumes will destroy flies, mosquitoes, and vermin without injuring furniture or fine curtains.—"Augustus," in Park and Cemetery.

AGRICULTURAL AND HORTICULTURAL SHOWS.

The Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respective shows, notify him of the date, and also of any change in date which may have been decided on.

The Markets.

AVERAGE PRICES FOR FEBRUARY.

Article.		FEBRUARY. Top Prices.		
		£	s.	d.
Bacon	lb.	0	0	6¾
Bran	ton	4	16	3
Butter, First	lb.	0	0	8½
Butter, Second	„	0	0	5½
Chaff, Mixed	ton	3	6	3
Chaff, Oaten	„	4	7	6
Chaff, Lucerne	„	2	19	4½
Chaff, Wheaten	„	2	12	6
Cheese	lb.	0	0	5
Flour	ton	8	3	9
Hay, Oaten	„	3	11	3
Hay, Lucerne	„	2	7	6
Honey	lb.	0	0	1½
Rice, Japan (Bond)	ton	15	7	6
Maize	bush.	0	3	8½
Oats	„	0	3	8¾
Pollard	ton	4	16	3
Potatoes	„	5	15	0
Potatoes, Sweet	„	1	13	9
Pumpkins	„	2	10	0
Sugar, White	„	15	15	0
Sugar, Yellow	„	12	5	0
Sugar, Ration	„	10	2	6
Wheat	bush.	0	3	3
Onions	cwt.	0	4	3¾
Hams	lb.	0	0	10¼
Eggs	doz.	0	1	0½
Fowls	pair	0	3	6¾
Geese	„	0	5	1½
Ducks, English	„	0	3	1½
Ducks, Muscovy	„	0	4	1½
Turkeys, Hens	„	0	7	0
Turkeys, Gobblers	„	0	12	10½

ENOGGERA SALES.

Article.	FEBRUARY. Top Prices.		
	£	s.	d.
Bullocks	7	5	0
Cows	4	19	4½
Wethers, Merino	0	12	2¼
Ewes, Merino	0	8	8¼
Wethers, C.B.	0	12	3¼
Ewes, C.B.	0	9	4½
Lambs	0	9	5¼

Orchard Notes for April.

By ALBERT H. BENSON.

Citrus are undoubtedly the fruits of the month, especially in the Maryborough and Northern coastal districts of the colony, so that a few words on their gathering, handling, and packing may not be altogether out of place, as the success or failure of an orchard depends quite as much on the careful handling and packing of the fruit as on any other orchard operations throughout the year.

In the first place, too great care cannot be exercised in the gathering of the fruit so as to prevent injury from bruising or otherwise, as a bruised fruit is always a spoilt fruit and will not carry. All citrus fruits, especially mandarins and lemons, should be cut instead of being pulled from the trees, clippers made for the purpose being used. In pulling citrus fruits you are apt to injure the fruit; the skin at the stem end being either lifted or entirely pulled out (plugged), which causes the fruit to decay from this spot, and this cause of loss is entirely obviated when the fruit is carefully cut. When cut, the fruit should be gently handled so as to prevent any bruising, and should be placed in cases to sweat, so as to toughen the skin and render it less liable to injury when packed. When sweated the fruit should be graded to size, and then firmly packed into the cases in which it is to be marketed or exported. Ordinary fruit, if firmly packed, will not need wrapping for intercolonial trade; but all fruit for export, and also extra quality fruit for intercolonial trade, will pay to be wrapped in good-quality, tough tissue-paper. Careful gathering, handling, grading, and packing are the secrets of success in marketing citrus fruits; close attention to same will result in a profit to the shipper, and neglect will mean failure.

During the month the orchard should be kept thoroughly cultivated, and where not already done should be got into proper shape after the summer rains so as to be ready for the winter work. New land to be set out to orchard should be got into order, as it is advisable to start early in order to get the land thoroughly pulverised and sweetened before planting the trees.

Insect and fungus pests should be fought wherever and whenever found, and all fruits, citrus especially, that are exported from the colony, should be cleaned from all scale or other insects infesting them. These remarks apply not only to citrus fruits but also to bananas, pineapples, custard apples, &c., as no fruits should be exported from Queensland unless they are free from disease of any kind.

Care should be taken to gather and destroy any guavas that may be lying under the trees, as these fruits are the breeding-grounds of the fruit fly, and if not destroyed are the medium of carrying this great fruit pest over from one season to another, so that it is impossible to devote too great care to the destruction of all fallen guavas or other fruits during the autumn, as by carefully attending to this the crop of fruit flies for the succeeding season will be materially diminished.

Note.—An error occurred in our transcription of Mr. Benson's Orchard Notes for last month, an important paragraph having been omitted. After cautioning fruitgrowers to look out for and destroy the fruit fly, Mr. Benson

wrote: "In the earlier part of last citrus season a large number of oranges were destroyed by the larvæ of the peach moth, the first sign that the fruit was attacked being a premature ripening; and if the fruit was carefully examined, a very small hole, usually at the stem or where two fruits touched, was found; and when the fruit was dissected, a small caterpillar, similar to that met with in maize and peaches, was found. The fruit, when attacked, fell off, and considerable loss was occasioned in several districts.

"The best remedy *for this* will probably be to spray the fruit, before it begins to colour, with Paris green, 1 oz. to 10 gallons of water," &c., &c.

The omission of the reference to the peach moth would make it appear that the remedy was intended for the fruit fly, which was not the meaning intended to be conveyed.

Farm and Garden Notes for April.

Farm Notes.—The last of the late maize crop should now be got in, and sorghum seed gathered as it ripens. Any land not ready for wheat should be got ready as soon as possible. Early sowings may be made this month. In many cases the potatoes sown last month will be ready for earthing up. Those who grow cotton will require to give the crop attention, as the pods will now be bursting, and the picking should be done as soon as the dew has evaporated. Cut and house tobacco as the leaves come to maturity. Lucerne may be sown, and what was sown last month must be kept clean, although the growth of weeds has now greatly slacked off. Sow oats, barley, rye, wheat, mangolds, and Swede turnips. All field vegetable seeds may be sown.

Kitchen Garden.—Keep down the weeds among the crops, and prepare well-dug, well-manured beds for transplanting the various vegetables now coming on. Thin out all overcrowded crops. Divide and plant out pot herbs, giving a little water, if required, until established. Sow broad beans, peas, onions, radish, mustard cress, and, in general, all kinds of vegetables. In dry weather earth up celery, and be careful to prevent the soil getting between the leaves. Hold the leaves in one hand and earth up with the other. Fill up occasionally, and your celery will be ready in about two months. Transplant cauliflowers and cabbages. Keep on hand a supply of tobacco waste, preferably in a powdered state. When slugs appear place a ring of this round your plants, and they will be as impregnable to the slug as the Boer entrenchments once were to the British soldiers; also water occasionally with a solution of one part decoction of tobacco to ten parts of water.

Horticultural Notes for April.

By PHILIP MAC MAHON,
Curator, Botanic Gardens.

The mean shade temperature of April at Brisbane is 70 degrees, a drop of 3 degrees from March. The mean rainfall for thirty-eight years has been 4·44 inches, with an average of 14 wet days. Thus it will be seen that the weather is becoming cooler and drier. The days are more pleasant to persons of European birth, and outdoor labour becomes exhilarating, and there is plenty of it to be done. Your garden wants thoroughly overhauling now, and you must work early and late. Digging and trenching, walk-making, ground formation, and all similar work may be taken in hand. If the weeds have gone ahead, as they are apt to do during March, especially if that month, as in this year, is warm and muggy, they must be tackled now, and the final deathblow given to them for this season. You may still sow all the annuals recommended to you last month. If you have already sown the bulk of your stock you may still make another sowing, and you will find the seedlings come in very handy later on. Those which are already up will keep you busy to get them pricked out into other beds, or into their permanent positions, before they have smothered each other. The growth will not now be so luxuriant and rampant, and, whether of shrubs or creepers, may be shortened back. Plants from which much flower is expected are always the better of being afforded an opportunity of thoroughly ripening the wood formed during the period of rapid growth; and this is effected by cutting out any weak straggling growth at this time of year, and allowing the sunshine to ripen and the air to fully circulate around the wood that is left. The final pruning may be delayed a little, and the plants will be all the better for this gradual thinning out.

Manure may be applied to land as it is being prepared for the winter occupants. Your compost heap, which has had such a large share of your attention all the summer, and to which you have added all the prunings and refuse of your garden, watering and turning it, will now repay you for all the labour you have bestowed upon it. You have a large heap of unctuous-looking manure ready to be dug lightly into the soil. There is not much use in burying to a great depth readily decomposable manure for temporary occupants of the soil. A little thought will teach you how to place the plant-food so that the delicate mouths of the plants can get it most readily when they want it most. You can plant out shrubs of all sorts, taking care that the sites are well drained and not mere pot-holes, in which the first shower of rain will form a little stagnant lake. Around Brisbane a layer of good soil usually overlies a bed of clayey earth formed of decomposed rock; and when a hole is made in this and filled in with good soil, all seems right for the reception of the tree, but the poor thing has no chance whatever in the bog which this becomes when the first moisture is applied. All beds and borders should be rough dug first, and then the manure applied. This can then be dug in. It will pay to apply bonemeal to land, only lightly turning it in, on which you propose to raise choice flowers or vegetables. Wood ashes, too, are amongst the very best dressings you can give to land. Have you not noticed how luxuriantly vegetation springs up where there has been a bonfire?

Roses.—Prune out in the way suggested above for other plants. Most people will tell you to wait for some months before you plant out roses. Well, I find that if your plants are well grown and hard you can plant them now with

perfect success. As the weather is becoming very much drier, these and all plants will, of course, require careful looking after in the matter of water, always bearing in mind that it is by no means good policy to reduce the earth round any newly shifted plant to a condition of bog and to keep it so.

In all your planting use every endeavour to act upon some definite plan. Strive to know exactly what you want and to work up to it. This is as necessary in a small place as in a large one. When you get into the habit, you will be surprised to find yourself forming mind's-eye pictures of what your place will be like, and fashioning and changing images in your mind of your garden under the varying aspects presented by the different plants you have to deal with. As a general scrawls upon the back of an official paper a few arbitrary signs and invests them in his mind with the life and motion of charging squadrons, so you will come to look upon your empty beds as if they were ablaze with the beauty you mean to bestow upon them. In this will lie much of the pleasure you derive from "the art which doth mend Nature."

In the vegetable garden you will be busy with the work outlined for you last month. You can sow beans, beets, cabbage, carrots, cress, endive, eschalots, kohl-rabi, leeks, lettuce, mustard, onions, parsnips, radish, spinach, tomato, and turnips. The cultivation of these was fully described last month, with the exception of tomatoes, which are the most wholesome, perhaps, of any vegetable grown in Queensland, and because of their easy cultivation should be found in every garden. The main crop should be sown about August, and beyond planting out in rich soil 3 or 4 feet apart, and training on a rough trellis made of light saplings or split bamboo, they will require little attention, except to stop the plant by pinching when the fruit begins to form. The autumn crop, which is now ripening, requires to have the foliage somewhat stripped to allow more light to penetrate to the fruit. A small sowing may be made now to bring on in a warm place with protection. Second sowings may be made of all the vegetables recommended last month. In the case of peas and beans the sowings may be large to keep up a good succession. Look closely after the seeds already sown, and if any show signs of failure see that they are replaced at once.

Public Announcements.

The Editor will be glad to receive any papers of special merit which may be read at meetings of Agricultural and Pastoral Associations in Queensland, reserving, however, the right to decide whether their value and importance will justify their publication.

The *Queensland Agricultural Journal* will be supplied to all members of Agricultural and Horticultural Societies who do not derive their livelihood solely from the land, on payment, in advance, of an annual subscription of 5s.

LIST OF AGRICULTURAL, HORTICULTURAL, AND PASTORAL SOCIETIES AND ASSOCIATIONS IN QUEENSLAND.

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Allora ...	Central Downs Agricultural and Horticultural Association	J. H. Buxton... ...	
Avondale ...	Avondale Farmers' and Planters' Association	N. J. Mikkelsen ...	
Ayr	Lower Burdekin Farmers' Association ...	Winsor H. Wilmington	
Beaudesert ...	Logan and Albert Pastoral and Agricultural Society	M. Hinchcliffe ...	11 May
Beenleigh ...	Agricultural and Pastoral Society of Southern Queensland	Wilson Holliday ...	14 April
Biggenden ...	Biggenden Agricultural and Pastoral Society	Charles H. Peppin ...	14 June
Biggenden ...	Biggenden Farmers' Association	Charles H. Peppin ...	
Birthamba ...	South Kolan Agricultural and General Progress Association	G. W. Nixon ...	
Blackall ...	Barcoo Pastoral Society	F. Clewett	
Boonah ...	Fassifern and Dugandan Agricultural and Pastoral Association	J. A. McBean ...	18 and 19 May
Bowen ...	Pastoral, Agricultural, and Mining Society ...	J. E. Smith	17 Aug.
Bowen ...	Preston Farmers' Association, Lower Proserpine	G. Archer	
Booyal ...	Proserpine Farmers' and Settlers' Association	G. W. Pott	
Brisbane ...	Booyal Farmers' Progress Association ...	Thos. Skillington ...	
Brisbane ...	Horticultural Society of Queensland	J. F. Bailey	26 and 27 April
Brisbane ...	Moreton Agricultural, Horticultural, and Industrial Association	J. Duffield	
Brisbane ...	Queensland Acclimatisation Society	E. Grimley	
Brisbane ...	Queensland Fruit and Economic Plant Growers' Association	G. K. Seabrook ...	
Brisbane ...	National Agricultural and Industrial Association of Queensland	H. C. Wood	10, 11, and 12 Aug.
Brisbane ...	Queensland Stockbreeders' and Graziers' Association	F. A. Blackman ...	
Brisbane ...	United Pastoralists' Association	Fredk. Ranson ...	
Bundaberg ...	Bundaberg Horticultural and Industrial Society	H. E. Ashley... ...	
Bundaberg ...	Council of Agriculture	S. A. Lindeman ...	
Bundaberg ...	Woongarra Canegrowers' and Farmers' Association	W. H. Dart	
Burpengary...	Burpengary Farmers' Association	C. H. Ham	
Byrnestown...	Byrnestown Farmers' Progress Association ...	J. Dufficy	
Caboolture ...	Caboolture Farmers' Association	G. Mallet	
Cairns ...	Aloombah Farmers' Association	Chas. R. Spencer ...	
Cairns ...	Cairns Agricultural, Pastoral, and Mining Association	A. J. Draper... ...	28 and 29 Sept.
Cairns ...	Cairns District Coffee Growers' Association...	W. A. Hannam ...	
Cairns ...	Cairns District United Farmers' Association	Wm. Griffin ...	
Cairns ...	Hambledon Planters' Association	E. Whitehouse ...	
Charleville ..	Central Warrego Pastoral and Agricultural Association	E. F. C. Manning ...	25 and 26 May

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Charters Towers	Towers Pastoral, Agricultural, and Mining Association	W. Tilley	30 and 31 May; 1 June
Childers ...	Isis Agricultural Association	H. Epps	
Childers ...	Childers Progress Branch, Isis Agricultural Association	N. Rosenlund ...	
Childers ...	Doolbi Mill Branch, Isis Agricultural Association	W. T. H. Job ...	
Childers ...	Childers Mill Branch, Isis Agricultural Association	H. Epps	
Clermont ...	Peak Downs Pastoral, Horticultural, and Agricultural Society	F. Leysley	
Clermont ...	Peak Downs Dairymen and Settlers' Association	A. G. Pursell ...	
Cooktown ..	Cook District Pastoral and Agricultural Society	W. R. Humphreys ...	
Cooran ...	Cooran Progress and Agricultural Association	Thos. Smith	
Cordalba ...	Cordalba Farmers' Association	B. Goodliffe	
Currajong ...	Currajong Farmers' Progress Association ...	Wm. Howard ...	
Cunnamulla	South Warrego Pastoral Association	J. Winward	
Deception Bay	Deception Bay Farmers' Association	B. J. T. Liscombe ...	
Degilbo ...	Degilbo District Farmers' Association ...	J. Harvey	21 and 22 June
Gayndah ...	Gayndah Agricultural and Horticultural Association	J. C. Kerr	
Gin Gin ...	Pastoral and Agricultural Society of Gin Gin	E. K. Wollen ...	
Gladstone ...	Gladstone Pastoral and Agricultural Association	W. J. Manning ...	
Gooburrum, Bundaberg	Gooburrum Farmers' and Canegrowers' Association	W. J. Tutin	
Goondiwindi	MacIntyre River Pastoral and Agricultural Society	A. Gough	
Gympie ...	Agricultural, Mining, and Pastoral Society	F. Vaughan	13 and 14 Sept.
Gympie ...	Chatsworth Farmers' Progress Association ...	William Bellman ...	
Gympie ...	Deep Creek Farmers' Progress Association ...	W. Reid	
Gympie ...	Gympie Horticultural Society	Charles Brasch ...	19 and 20 April
Gympie ...	The Pie and Eel Creek Farmers' Association	D. J. O'Farrell ...	
Gympie ...	Gympie Central Farmers' and Progress Association	J. Howard Maynard	
Haslemore, Victoria, Herbert Riv.	Herbert River Farmers' League	Alfred Henry ...	
Helidon ...	Helidon Scrub Farmers' Progress Association	M. Morgan	
Herbert River	Halifax Planters' Club	H. G. Faithful ...	
Herbert River	Macnade Farmers' Association...	E. C. Biggs	
Herbert River	Ripple Creek Farmers' Association	J. W. Grimes ...	
Herberton ...	Mining, Pastoral, and Agricultural Association	John M. Hollway ...	3 and 4 April
Hodgson ...	Hodgson Farmers' Association	C.W. Nimmo ...	
Hughenden...	Hughenden Pastoral and Agricultural Association	H. P. Blackall ...	7 and 8 May
Ingham ...	Herbert River Farmers' Association	...	
Ingham ...	Herbert River Pastoral and Agricultural Association (Stock Show)	P. J. Cochrane ...	15 and 16 June
Ingham ...	Herbert River Pastoral and Agricultural Association (Agricultural Show)	P. J. Cochrane ...	Sept.
Ipswich ...	Ipswich and West Moreton Agricultural and Horticultural Society	P. W. Cameron ...	21 Sept.
Ipswich ...	Queensland Pastoral and Agricultural Society	Elias Harding ...	1 and 2 June
Kandanga (near Gympie)	Kandanga Farmers' Association	N. Rasmussen ...	
Kolan ...	Kolan Canegrowers' and Farmers' Association	C. Marks	
Ladeside ...	Mungore Farmers' Association...	J. M. Robinson ...	
Laidley ...	Lockyer Agricultural and Industrial Society	John Fielding ...	25 and 26 July
Loganholme...	Logan Farming and Industrial Association ...	F. W. Peek	
Longreach ...	Longreach Pastoral and Agricultural Society	J. P. Peterson ...	12 April
Lucinda Point	Victoria Farmers' Association	W. S. C. Warren ...	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Mackay ...	Agricultural, Pastoral, and Mining Association	F. Black	
Mackay ...	Pioneer River Farmers' Association	E. Swayne	28 and 29 June
Mapleton, *viâ* Nambour	Mapleton and Dulong Fruitgrowers' and Farmers' Progress Association	W. J. Smith	
Maryborough	Maryborough Horticultural Society	H. A. Jones	
Maryborough	The Island Farmers' Progress Association ...	C. A. Schmidt ...	
Maryborough	Wide Bay and Burnett Pastoral and Agricultural Society	G. Willey	4, 5, and 6 July
Miallo ...	Miallo Progress Association	E. F. Welchman ...	
Milbong ...	Milbong Farmers' Association	T. R. Garrick ...	
Mitchell ...	Mitchell and Maranoa Pastoral, Agricultural, and Vinegrowers' Association	H. J. Corbett ...	
Mosman River	Mosman River Farmers' Association	Geo. W. Muntz ...	
Mount Cotton	Mount Cotton and Tingalpa Division Fruitgrowers' and Farmers' Association	F. N. Sharman ...	
Mount Mee...	Mount Mee Farmers' Association	R. Thomas	
Mount Morgan	Mount Morgan Mining, Agricultural, Poultry, Pastoral, and Horticultural Society	G. Orford	
Mount Morgan	Mount Morgan Agricultural, Pastoral, and Poultry Society	Thos. W. Walker ...	
Mundoo ...	Johnstone River Farmers' Association ...	J. McInnes	
Nerang ...	South Queensland and Border Pastoral and Agricultural Society	W. J. Browne ...	8 Sept.
North Isis ...	North Isis Canegrowers' Association	W. J. Young ...	
Pialba ...	Pialba Farmers' Association	J. B. Stephens ...	
Pickenjennie	Wallumbilla Selectors' League	George Dalziel ...	
Pickenjennie	Pickenjennie Branch, Wallumbilla Selectors' League	George Dalziel ...	
Pinbarren ...	Pinbarren Agricultural and Progress Association	H. Armitage, senr. ...	
Port Douglas	Pastoral, Agricultural, and Mining Association	W. H. Dorrat ...	
Razorback ...	The Razorback Fruitgrowers' Association ...	Robert Tinning ...	
Rockhampton	Central Queensland Farmers' and Selectors' Association	T. Whitely, Coowonga	
Rockhampton	Central Queensland Pastoral Employers Association	G. Mackay	
Rockhampton	Central Queensland Stockowners' Association	R. R. Dawbarn ...	
Rockhampton	Rockhampton Agricultural Society	R. R. Dawbarn ...	10 and 11 May
Roma ...	Western Queensland Pastoral and Agricultural Association	Angus McPherson ...	25 and 26 July
Roma	Yingerbay Farmers' Association	Alex. C. McIntyre ...	
Rosewood ...	Farmers' Club	P. H. Adams... ...	25 Aug.
Southport ...	Southport Horticultural Society	E. Fass	19 April
Springsure ...	Queensland Pastoral Society	G. R. Milliken ...	
Stanthorpe ...	Border Pastoral, Agricultural, and Mining Society	Geo. Simcocks ...	22 and 23 Feb.
Stanthorpe ...	Stanthorpe Horticultural and Viticultural Society	R. Hoggan	
Stanwell ...	The Stanwell Agricultural Society	A. Spanner	24 May
St. George ...	Balonne Pastoral and Agricultural Association	T. M. Cummings ...	
Tinana ...	Tinana Fruitgrowers' and Farmers' Association	Chas. Parke	
Toowoomba...	Darling Downs Horticultural Association ...	H. Hopkins	
Toowoomba...	Drayton and Toowoomba Agricultural and Horticultural Society	H. Symes	
Toowoomba...	Royal Agricultural Society of Queensland ...	F. Burtt	1, 2, and 3 Aug.
Townsville ...	Townsville Pastoral, Agricultural, and Industrial Association (formerly North Queensland Pastoral and Agricultural Association)	J. N. Parkes	6 and 7 June
Wallumbilla	Wallumbilla Selectors' League	George Dalziel ..	
Warwick ...	Eastern Downs Horticultural and Agricultural Association	J. Selke	31 Jan. & 1 Feb.
Wellington Point	Wellington Point Agricultural, Horticultural, and Industrial Association	F. W. Wort	13 June
Woombye ...	Woombye Fruitgrowers' Association	P. S. Hungerford ...	
Woowoonga	Woowoonga Scrub Farmers' Association ...	H. B. Griffiths ...	
Zillmere ...	Zillmere Horticultural Society	C. McF. Fischer ...	20 Jan.

"THE DISEASES IN PLANTS ACT OF 1896."

Department of Agriculture,
Brisbane, 19th January, 1899.

HIS Excellency the Governor, with the advice of the Executive Council, and in pursuance of the provisions of "*The Diseases in Plants Act of* 1896," has been pleased to make the following further Regulations.

J. V. CHATAWAY.

THE FUMIGATION OF FRUIT FOR EXPORT.

1. Any one who wishes to erect a chamber or building for the fumigating of fruit is requested to give notice to the Under Secretary for Agriculture, who will take steps to see that the chamber or building is properly constructed.

2. When it is required to fumigate fruit for export, twenty-four hours' notice must be given to the said Under Secretary or such other officer as may be duly authorised to accept such notice.

3. The operation of fumigating must be conducted under the control of an officer authorised by the Minister for Agriculture.

4. The fumigating chamber may be made of any convenient size or material, the essential point being that it shall be capable of being closed absolutely airtight, and provided with a flue-pipe in the roof which can be opened or closed to allow of the escape of the gas after fumigation. The flue must be provided with a box or chamber to contain caustic soda or potash to destroy the gas.

The fumigating chamber must be provided with a shutter or sliding panel in the lower portion of the door or wall.

Door, flue, and shutter must all be made to close absolutely airtight.

DIRECTIONS FOR FUMIGATING WITH HYDROCYANIC ACID GAS.

Proportions of Ingredients.—For every 150 cubic feet of room take 1 ounce of cyanide of potassium, 5 fluid ounces sulphuric acid, 10 fluid ounces water.

Having placed the fruit to be fumigated in the chamber, see that the flue and the shutter in the door or lower part of all are properly closed.

The acid is then to be diluted in the following manner:—The whole of the water is placed in a shallow china or glazed earthenware vessel, such as an ordinary wash-hand basin. (Metal vessels are inadvisable unless they are leaden ones.) The sulphuric acid is next poured on to the water in a thin stream, stirring the while with a stick. Do not mix by adding the water to the acid.

The basin containing the acid thus diluted (which should be allowed to cool) is now placed in the fumigating chamber, and the cyanide of potassium is emptied into it.

The gas is given off with great violence, and the door should be immediately closed.

The whole is now to be left to itself for one hour. At the end of this time the shutters in the flue and in the door are opened, and the draught produced drives the gas out of the chamber. At the end of half an hour the door is thrown open, and if the draught has been effective there should be hardly any trace of hydrocyanic gas recognisable. The chamber may be left in this condition for another ten minutes or a quarter of an hour. The fruit is now to be moved and allowed to remain in a well ventilated place, preferably out of doors, for another half an hour. Samples of fruit will be examined from time to time by the entomologist.

Caution.—As hydrocyanic acid gas is most deadly in its effects on animal life, the greatest care must be taken in its use.

Department of Agriculture,
Brisbane, , 18 .

This is to certify that has treated cases of citrus fruit with hydrocyanic acid gas for one hour, under my supervision. These cases have been branded "Crown" over "Passed."

Shipping marks:
Per S.S.:
Consigned to:

Department of Agriculture,
Brisbane, 26th January, 1899.

THE following Proclamation by His Excellency the Governor of New South Wales is published for general information.

J. V. CHATAWAY.

NEW SOUTH WALES, to wit.
(L.S.)
HAMPDEN,
Governor.

PROCLAMATION.

By His Excellency The Right Honourable HENRY ROBERT, VISCOUNT HAMPDEN, Governor and Commander-in-Chief of the Colony of New South Wales and its Dependencies.

WHEREAS the Governor is empowered by Section 9 of the "Vegetation Diseases Act, 1897," from time to time, by Proclamation in the *Gazette*, to declare any fungus or vegetable parasite whatever to be a fungus within the meaning of the said Act: Now, therefore, I, HENRY ROBERT, VISCOUNT HAMPDEN, the Governor aforesaid, with the advice of the Executive Council, do, by this my Proclamation, declare Black Spot (*Fusicladium*) to be a fungus within the meaning of the said Act.

Given under my Hand and Seal, at Government House, Sydney, this twenty-second day of December, in the year of our Lord one thousand eight hundred and ninety-eight, and in the sixty-second year of Her Majesty's reign.

By His Excellency's Command,

JOSEPH COOK.

GOD SAVE THE QUEEN!

Department of Agriculture,
Brisbane, 25th May, 1899.

HIS Excellency the Governor, with the advice of the Executive Council, has, in pursuance of the provisions of "*The Slaughtering Act of* 1898," been pleased to make the following Regulations.

J. V. CHATAWAY.

REGULATIONS UNDER "THE SLAUGHTERING ACT OF 1898."

Definitions.

1. Save as herein otherwise provided, in these Regulations the terms used have the meanings respectively assigned to them by "*The Slaughtering Act of* 1898."

The term "Stock" means and includes cattle, sheep, and swine;

The term "Licensing Court" means a Police Magistrate or if he is absent or there is no Police Magistrate, then any two justices sitting in a Court of Petty Sessions having jurisdiction in the district within which a slaughter-house is or is proposed to be established;

The term "Inspector" means the inspector (if any) to whom a district is assigned, or if he is absent, or there is no such inspector then any inspector appointed under the provisions of "*The Slaughtering Act of* 1898";

The term "Owner of stock" means the owner whether jointly or severally of the stock, or the authorised agent or superintendent of the owner, or the drover or person in charge of the stock.

Unlicensed slaughter-house.

2. Any person who establishes or keeps an unlicensed slaughter-house is guilty of an offence against these Regulations.

Illegal slaughter.

3. No person shall slaughter at any place other than at a licensed slaughter-house any stock the flesh of which is intended to be used for meat.

Licensing Court.

4. Subject to these Regulations, the Licensing Court may license slaughter-houses established or proposed to be established within a district.

Application.

5. Every person who desires to obtain a license or the renewal of a license for a slaughter-house shall make an application therefor in writing in the form in the First Schedule hereto or to the like effect.

Time for applying.

6. Every application shall be addressed to the Licensing Court of the district within which the slaughter-house is or is proposed to be established, shall be lodged with the proper Clerk of Petty Sessions, and shall be accompanied by the license fee hereinafter prescribed. Applications for licenses shall be so lodged on or before the fourteenth day of December, March, June, and September in each year. Applications for the renewal of licenses shall be so lodged on or before the fourteenth day of December in each year.

Duty of clerk of petty sessions.

7. Upon the receipt of every such application, the clerk of petty sessions shall forthwith forward a copy of the same to the local authority of the district and also to the inspector.

Representatives of local authority.

8. The local authority of the district may make to the Licensing Court such representations, in writing or otherwise, with respect to every such application, as the local authority thinks fit.

Report of inspector.

9. It shall be the duty of the inspector, upon the receipt of every such copy of an application, to inspect the premises in respect of which a license or the renewal of a license is applied for, and to report thereon to the Licensing Court. He shall either make such report in writing under his hand, or, if directed so to do by the chief inspector, shall personally attend at the sittings of the Licensing Court, and there orally report to the Court upon the same.

The hearing.

10. The Licensing Court shall sit for the hearing and determination of all applications for licenses on the first Tuesday in the months of January, April, July, and October in every year.

The Licensing Court shall sit for the hearing and determination of all applications for the renewal of licenses on the first Tuesday in the month of January in every year.

After considering the report of the inspector and the representations, if any, of the local authority of the district, the Court may, subject to these Regulations—

(1) Grant the application; or
(2) Adjourn the application for the purpose of the execution by the applicant of such works as in the opinion of the Licensing Court are necessary to render the premises suitable and proper for the slaughter of stock; or
(3) Refuse the application.

Duration of license.

11. Save as hereinafter provided, a license for a slaughter-house shall remain in force for the period of one year, but may from time to time be renewed for a like period. Provided that a new license granted for a slaughter-house shall only remain in force until the sitting of the Licensing Court held in the month of January following the date on which such license was granted. Provided further that all existing licenses shall remain in force until the sitting of the Licensing Court held in the month of January next.

Fees for licenses.

12. The annual fee payable in respect of the license or the renewal of the license of a slaughter-house shall be twenty shillings.

Fees for defraying expenses.

13. The fees payable by the licensee of a slaughter-house for the purpose of defraying the expenses of inspection shall be as follows, that is to say:—

	s.	d.
For every bullock, steer, cow, or heifer slaughtered ...	0	3
For every 12 sheep or calves slaughtered	0	3
For every head of swine slaughtered	0	3

Such fees shall be paid by the licensee to the inspector monthly, or at such shorter intervals as the inspector may require.

Receipt.

14. The inspector shall, upon the payment of such fees, give to the licensee a receipt under his hand in the form of the Second Schedule hereto.

Delivery note.

15. When stock are delivered at a slaughter-house to be slaughtered, the owner of the stock shall deliver to the owner of the slaughter-house a way bill or delivery note of the stock, setting forth the number, the description, and the brands or marks of the stock, and signed by the owner thereof.

The owner of the slaughter-house shall retain and preserve every such way bill or delivery note, and shall, on demand, produce the same to the inspector.

Slaughtering book.

16. The licensee of every slaughter-house shall keep a book called a "Slaughtering Book," in which shall be correctly recorded all the particulars set out in the Third Schedule hereto; and such book shall be open at all reasonable times to the inspection of any inspector, or any inspector of brands or police officer, who may make any copy of or extract therefrom.

Floors.

17. The floor of every place in a slaughter-house where stock are pithed or slaughtered, or where meat is dressed, prepared, treated, or stored, shall, if required by the inspector, be constructed of concrete or otherwise rendered impervious, to his satisfaction.

Drainage; ventilation.

18. Every slaughter-house shall be drained and ventilated to the satisfaction of the Inspector.

Blood.

19. In every slaughter-house all blood shall be boiled, desiccated, or otherwise treated to the satisfaction of the Inspector.

Privies.

20. Every water-closet, privy, cesspool, and urinal used in connection with a slaughter-house shall be situated at a distance of not less than one hundred yards from any building, enclosure, or place in or at which stock are slaughtered or meat is dressed, prepared, treated, or stored.

Pigsties.

21. Every pigsty, enclosure, and place where swine are kept at a slaughter-house shall be situated at a distance of not less than two hundred and fifty yards from any building, enclosure, or place in or at which stock are slaughtered or meat is dressed, prepared, treated, or stored.

Offal to swine.

22. Swine shall not be fed with offal at a slaughter-house, nor shall any offal be removed therefrom for the purpose of feeding swine, unless such offal has first been thoroughly cooked.

Notice of slaughtering.

23. The owner of every slaughter-house shall give to the inspector such notice of his intention to slaughter stock as will enable the inspector to inspect such stock.

Tampering with meat.

24. Until stock slaughtered have been inspected by the inspector the pleuræ are not to be stripped or otherwise interfered with, and no part of the carcass is to be cut away, manipulated, or interfered with in any manner which may prevent the discovery of disease or may alter the true condition of the meat.

The inspector may condemn any stock or meat which in his opinion has been dealt with in contravention of the provisions of this Regulation.

Branding meat.

25. When the inspector has inspected any meat and approved of the same, he shall brand each separate quarter of beef and each carcass or quarter of mutton with a mark or stamp.

Any person who wilfully removes or obliterates any such mark or stamp, or who, not being an inspector, affixes or causes to be affixed to any meat any such mark or stamp, is guilty of an offence against these Regulations.

Calves.

26. Calves less than four weeks old are not to be slaughtered for meat.

Condemned meat.

27. Condemned meat at a slaughter-house shall be rendered unfit for the food of man in the mode directed by the inspector.

Removal of hides, &c.

28. Offal and the hides, skins, heads, and feet of stock slaughtered at a slaughter-house shall only be removed from the premises in the manner and at the times directed by the inspector.

The contents of paunches and of intestines shall be deposited in the place appointed by the inspector for the purpose.

Carriage of meat.

29. Meat shall be carried from the slaughter-house to the butcher's shop in vehicles approved by the inspector.

Every such vehicle shall be provided with a proper roof, and shall be so constructed as to permit of a free current of air.

Meat shall be carried in such vehicle either suspended from the roof or sides thereof, or so arranged that a free current of air may circulate between the carcasses or portions of carcasses being carried.

Blowing meat, &c.

30. No person shall blow with his breath or otherwise into any meat, or eject any salt, liquid matter, or other substance from his mouth thereon.

No person shall treat, dress, or prepare any meat by means of any preservative or other substance which, in the opinion of the inspector, injures, or is likely to injure, such meat or to render it unfit for the food of man.

Offences.

31. Any person who contravenes any of the provisions of these Regulations is guilty of an offence, and is liable to a penalty not exceeding fifty pounds.

When a licensee of a slaughter-house, having been convicted of an offence against "*The Slaughtering Act of* 1898" or these Regulations, is on a second or subsequent occasion convicted of an offence against such Act or Regulations, the Court, by or before whom he is so convicted as last aforesaid, may, in addition to the punishment for such offence, order the license of the slaughter-house to be suspended for such time as the Court thinks fit, or to be absolutely cancelled, and such license shall be so suspended or cancelled accordingly.

FIRST SCHEDULE.

APPLICATION FOR A LICENSE OR THE RENEWAL OF A LICENSE OF A SLAUGHTER-HOUSE.

"*The Slaughtering Act of* 1898."

To the Licensing Court for the District of [*name of District*].

I [*or* we] hereby apply to the Licensing Court to be holden for the district of [*name of district*] for a license [*or* the renewal of a license] of a slaughter-house proposed to be established [*or* established] at [*describe locality so as to clearly identify it*].

Dated at the day of

Applicant.

SECOND SCHEDULE.

RECEIPT.

"*The Slaughtering Act of* 1898."

I have this day received from [*name of licensee or licensees*] the sum of £ , being fees in respect of stock slaughtered at the slaughter-house at [*situation of slaughter-house*], whereof he is the licensee [*or* they are the licensees], between the day of and the day of .

The particulars of the stock are as follow:—

Cattle [*insert number*]
Sheep and Calves [*insert number*]
Swine [*insert number*]

Dated at the day of

Inspector.

THIRD SCHEDULE.

SLAUGHTERING BOOK.

Date of Slaughtering.	Number of Stock Slaughtered.			Person from whom Stock obtained.	Brands or Marks.
	Cattle.	Sheep.	Swine.		

REGULATIONS UNDER "THE SLAUGHTERING ACT OF 1898."

Department of Agriculture,
Brisbane, 15th November, 1899.

HIS Excellency the Lieutenant-Governor, with the advice of the Executive Council, has, in pursuance of the provisions of "*The Slaughtering Act of* 1898," been pleased to make the following additional Regulation.

J. V. CHATAWAY.

32. Clause 12 of the Regulations under "*The Slaughtering Act of* 1898," dated the twenty-fifth day of May, 1899, and published in the *Government Gazette* dated the twenty-seventh day of May, 1899, is amended by the addition of the following paragraph:—

Provided that the annual fee payable in respect of such license or renewal of such license issued to persons who only slaughter calves and pigs, but not exceeding five head in all in any week, shall be two shillings and sixpence.

By Authority: EDMUND GREGORY, Government Printer, William street, Brisbane.

Agriculture.

WESTBROOK STATE FARM.

EXPERIMENTS WITH POTATOES.

Some instructive experiments have been made at the Westbrook State Farm, with a view to ascertaining the value of various manures as applied to potatoes. In conducting experiments of this nature it should be remembered that artificial or farmyard manures will not invariably produce the same results on different soils. The rich black soils of the Darling Downs contain certain constituents which are wanting in lighter western or coast soils. In some there may be already a sufficiency of phosphoric acid; consequently an application of superphosphate might prove injurious. It is an acid manure, and, in the absence of lime to neutralise it, it may, as stated, prove injurious. Again, the bones of animals are formed solely from phosphate of lime contained in forage plants, which are all rich in phosphoric acid; hence a continual impoverishment of the soil in phosphoric acid must result from their culture. Where cultivation grounds are deficient, as most of them are, in phosphoric acid, it becomes necessary, in order to obtain a better crop, to secure support in the form of an easily soluble phosphoric acid. Bonedust is a phosphoric acid manure which gives this result. But superphosphates produce better and quicker results. For potatoes, a fertiliser rich in potash is essential. For general purposes a good mixed fertiliser should consist of—Available phosphoric acid, 7 per cent.; potash, 11 per cent.; nitrogen, 3 per cent.; 700 lb. to the acre. Much larger quantities of the abovenamed fertiliser are often used with much profit, and farmers have been known to use 2,000 lb. per acre, obtaining the best paying results. Sulphate of potash is mostly employed as a source of potash for potatoes. Some have experienced that muriate produces a good quality and as high, if not a higher, yield than by using the sulphate.

Dried blood contains on an average 11 to 13 per cent. of nitrogen. It is, however, less soluble than sulphate of ammonia and nitrate of soda. Manures containing sulphate of ammonia should not be mixed with lime, nor applied to land which has recently been limed.

Kainit is a mixture of the sulphate of potash and lime, together with chlorides of magnesium and sodium. Its main value lies in its potash, which it contains to the extent of 12 per cent. Kainit should be used in conjunction with other manures of a phosphatic nature. It is the cheapest of the potash manures.

In this issue we print some analyses of soils of the State Experiment Farms, and of the Agricultural College, which are the first published analyses of the Queensland soils. Mr. J. C. Brünnich, Chemist to the Department of Agriculture, who carried out the analyses, prefaces the tables of results with a highly interesting and popular description of the methods adopted in his laboratory to arrive at the results here published.

The experiments at Westbrook, carried out by the manager, Mr. H. C. Quodling, were made on small areas of Brownell's Beauty potatoes. Unfortunately the results were somewhat affected by the dry weather. The manures used were:—

Superphosphate	at the rate of	4	cwt.	per	acre.
Bonedust	"	"	4	"	"
Blood	"	"	4	"	"
Kainit	"	"	4	"	"

One plot was unmanured and planted with cut potatoes, and in the last plot, also unmanured, the potatoes were planted whole.

Manure.	Rate per Acre.	Weight of Seed Planted.	Cut or Uncut.	Yield per Plot.	Area of each Plot.
	Cwt.	Lb.		Lb.	Acre.
Superphosphate...	4	178	Cut.	716	¼
Bonedust	4	178	,,	704	¼
Blood	4	178	,,	712	¼
Kainit	4	178	,,	722	¼
Unmanured	...	178	,,	751	¼
Unmanured	...	178	Uncut.	708	¼

POTATO EXPERIMENTS IN CHESHIRE.

A REPORT has recently been issued on the potato experiments which have been carried out at the Agricultural and Horticultural School belonging to the Cheshire County Council, England. The year 1899 is the fourth year in succession in which this class of experiment has been undertaken, as it is found that this continuance is necessary to verify previous results or otherwise. The objects in view have been :—

1. To test the productiveness, character, and quality of a considerable number of varieties, especially new varieties, a small quantity of each being planted.

2. To show more thoroughly on a large scale the characteristics, yield, and cooking quality of those varieties which gave the best results in the previous year's trials.

3. To test whole sets *versus* cut sets.

4. To try the effect of sets of different sizes and weights.

5. To see if artificial manures have much effect upon the yield when applied alone and in conjunction with farmyard manure.

6. To try the effect of different nitrogenous and potassic manures on the yield and size of the tubers; also on the cooking quality of the tubers.

7. To see whether it is better to apply nitrate of soda at the time of planting or as a top dressing two months later.

8. To mark the effects of disease on different varieties.

The report contains a very valuable series of tables, with various remarks on them which are worth studying by Australian potato-growers. The conclusions arrived at are briefly summed up as under :—

1. There seems to be very little difference between planting whole sets and cut sets, but, if anything, the average results of the last four years are in favour of whole sets.

2. That large seed is more profitable to plant than small seed.

3. That an artificial manure containing nitrogen, phosphoric acid, and potash in suitable proportions will increase the yield considerably over no manure.

4. That farmyard manure will produce much better results than artificial manures alone. This is probably due to the mechanical influence that farmyard manure has upon the soil.

5. That the best results are again obtained from 3 cwt. superphosphate, 1 cwt. sulphate of ammonia, 1 cwt. muriate of potash, and 15 tons of farmyard manure.

6. That manures have a considerable influence upon the size and cooking quality of the tubers.

7. That sulphate of ammonia seems to be the best form in which to apply nitrogen to potatoes.

8. That muriate of potash produced better results than either kainit or sulphate of potash.

9. The yield per acre this year is less than last year's in almost every variety of potato tried.

MANILA AND SISAL HEMP.

Since the commencement of the war between the United States, the Spanish, and the Philippinos, the production of Manila hemp has seriously decreased, and its value has proportionately increased. As a consequence of the shortage of manila, the price of sisal hemp has risen, and high prices are being paid for sisal fibre of suitable length (over 6 feet). Manila hemp is produced from the fibre of the *Musa textilis*, a plant belonging to the banana family, but distinct from the *Musa sapientum* and *Cavendishii*, or that producing the edible fruit of commerce. The plant grows from planted shoots to a height of 10 feet, and is from 5 to 7 inches diameter. It is cut down when three years old, and stripped of its fibre by native cleaners, another shoot being at the same time planted to take its place. The stalk is stripped of its leaves, and the stout pith in the centre is found to be surrounded by alternate layers of fibre and a sappy, vegetable matter. These layers of fibre must be carefully removed at once to prevent rotting, and dried in the sun. A full-grown tree yields about 1 lb. of fibre in 6 to 8 feet lengths. This stripping is an exceedingly difficult and important process in the production of the hemp, and requires great experience.

The sisal hemp plant has been exhaustively described in this *Journal*, and the method of cultivation and manufacture were also explained. There are large areas of land within a few miles of Brisbane which are eminently adapted to the growth of the plant. There is little outlay required in its cultivation; the poorest gravelly soil will produce a splendid crop. Stray cattle will not destroy it, and it is proof against long droughts. Machinery of an inexpensive nature for separating the fibre is obtainable; yet the barren lands remain waste, and a product of great value is ignored.

ON TOMATOES.

By an INDIAN EXPERT.

In December, 1897, we published a very excellent article on tomato culture by Mr. H. Tardent, manager of Biggenden State Farm. As it is probable that many farmers have not seen the article alluded to, and considering the very great value of the tomato as a most healthy and agreeable vegetable or fruit, not to speak of its undoubted market value, we now supplement that article by one written by an Indian expert in the *Pioneer*:—

VARIETIES.

I may say at once the varieties are very numerous, but by no means so numerous as the perusal of half-a-dozen seedsmen's catalogues would lead you to suppose. We all have our little failings, and your seedsman is nothing lacking. Hence it comes that some tomato is one seedsman's "Conqueror," another's "Ne plus ultra," or "Robinson's Invincible," and as a simple matter of fact this tomato is Brown's, Smith's, and Robinson's leading line in tomatoes. A very fine thing you will find it described, and it is probably quite true; but if you buy it from the three it is 100 to 1 you will get one kind of tomato. Here is a practical illustration. Some eleven years ago a very fine tomato was brought out, called "Empress of India." I have grown that tomato ever since, and it is very fine—even to-day, brilliant in colour, beautifully shaped, and fine in quality and large. Now I find some difficulty in finding Empress of India in the lists; it has undoubtedly slipped out of a lot altogether, but another kind is pretty general, and variously termed "Perfection": that I have grown, and I find it simply my true friend Empress of India tomato, and about a quarter of a hundred of other kinds grown are largely synonymous. The tomato-grower will do well, therefore, to select a real good type and stick to it, and prove the improvements so-called one or two at a time, and on no account be deluded into a multitude of varieties.

I hear some reader say, "Oh! but anybody can grow tomatoes," and that is quite true; they will grow themselves, in fact, if you only plant them—that, however, is not the way to produce either quantity or quality; and it is quantity combined with quality that pays in most things. We will, therefore, set aside slipshod methods, and come to a simple yet scientific method that will give exceptionally fine fruits and plenty of them.

SEED SOWING.

Having made a good selection, sow in boxes or pots. I find boxes much the best. The tomato is a considerable time in coming into fruiting from seedlings; therefore, sowing should be arranged for in good time, and the boxes may conveniently be about 4 inches deep. Into the boxes put half-an-inch of drainage, such as cinders, and on this a couple of inches of good garden soil of a light sandy nature. Now make up a mixture of fine soil and thoroughly decomposed manure and leaf soil in equal parts; mix all well together, and fill in the boxes to within half-an-inch of the tops. Firm regularly and moderately, and make all perfectly level with a piece of planed board, and water down the soil. They are now ready for sowing, which should be done carefully. The tomato seed is a large one, and it will be much the best plan to place each seed separately about half-an-inch apart; in this way every seed will have an individual chance, and come up strong, much superior to a box sown at random, and generally much too thick. Having carefully placed the seed, sift some fine soil over it to a depth of two-eighths of an inch; give another light watering, and transfer boxes to some dark warm place, until the seed has germinated, carefully watching the while that the soil in the boxes does not get dry. As soon as germination is seen to be ensuing, the boxes may be transferred to the open absolutely free from shade.

PRICKING OFF THE SEEDLINGS.

As soon as the seedlings are strong with a pair of good leaves and another pair in progress, they should be pricked off into other boxes somewhat deeper. Ordinary kerosene boxes cut in half answer well. Here, however, the previous proceedings should be reversed as regards soil, and the rich mixture of manure, light sandy loam, and leaf should go into the box first; and there may with advantage be two-fourths of manure, one of leaf soil, and one of loam to the depth of half the box; on top of this any good light friable garden soil will do. Into this mixture, transplant the seedlings 3 inches apart; shade for a few days, and then transfer full into the sun. Attend carefully to watering, and allow the plants to grow unrestrictedly until the boxes are pretty full of roots—in fact, what the horticulturist terms "slightly root bound." There is a distinct object in this—namely, to induce the plants to show flower much earlier than they otherwise would do so; but the moment the buds can be seen it will be time to consider their permanent quarters.

PREPARATION FOR PERMANENT PLANTING.

Now the man that can grow good potatoes should also be able to grow good tomatoes, and if the soil is known to be a good potato soil it will for certain suit tomatoes admirably. For, in spite of the very great difference between a potato tuber and a tomato fruit, there is in all other respects a close similarity between the potato plant and the tomato plant, so much so that one can be grafted quite successfully on to the other and *vice versâ*, and the potato plant will in this way yield a crop of potatoes below ground and tomatoes above it. Furthermore, the tomato, like the potato plant, demands abundance of potash for its vigorous existence, and also like the potato it is a very fine and profuse rooter; therefore, hard lumpy soil is ill-adapted to its requirements. The soil should, therefore, be thoroughly cultivated to the depth of at least 1 foot or more, and be fine mealy soil, in order that the fine roots may move freely through it and abstract all they require in the early stages of the plants. If

the soil is admittedly a good and fertile one, no manure need be added to it in the operation of digging; if, however, through cropping or any other cause the soil is impoverished, a good dressing of thoroughly rotted manure should be added; and if the scrapings of virgin jungle land are available, they are an admirable and valuable manure for the tomato plant.

PLANTING OPERATIONS.

Having thoroughly prepared the soil and obtained the first indication of flower buds, the plants are now ready for permanent planting, and the exact method to be adopted comes up at once for consideration. The best method of all for the production of fine quality large tomatoes is on single stems—that is to say, one plant one stem, and therefore no laterals; but this will the better be made clear by an example, Suppose the cultivator selects a piece of ground 50 feet wide and 100 feet long, and plants 1 foot apart in the lines, and the lines one from the other 3 feet apart. The plot will require 1,600 plants, and this number may be so planted for single stem-plants; or each plant be allowed to carry two or, at the most, three stems each; but it comes to much the same thing, as the three stems will require room, and there must be a reduction in numbers to allow for this; and the fruits, moreover, are not calculated to come so fine on three-stem plants as on one. I would, therefore, select the best and most profitable method for exceptionally fine fruits—namely, single-stem plants. Accordingly, large-sized drills or small trenches may be got out, and the first flower-buds got as near the surface as possible, in order that the fruiting may begin from the bottom. It may be advisable to lay some plants in slanting to effect this end, which is a very good plan. Any buried stem will be certain to root later on, which is no disadvantage whatever. Suppose this example is carried out, there will be sixteen rows of 100 plants, each 1 foot apart and 3 feet between the rows or lines; and this involves a system of training, each plant being grown perfectly vertical. No doubt the best and most economical method in the end is by posts and strained wires—two terminal posts, and one in the centre for each line; but failing this posts may be driven in at intervals 6 feet long, or more, and by a system of horizontal and vertical lacing of split-up bamboo, hurdle or gate fashion, a substantial training fence be made and easily taken down, and the wood stored for another season when done with, merely leaving the permanent posts in the ground, or even these may be taken up. Having planted the young plants, previously soaking the boxes before transplanting and doing the planting well, we come to a thorough system of after-management.

PRUNING AND TRAINING.

Now, whether the grower elects to have one, two, or three shoots to each plant, all else should be regularly and systematically destroyed as it appears; with every new point there will inevitably be a couple or three lateral shoots. The moment these are large enough take them out, and at the same time secure the plants as they grow to the trellising with a loose tie. In practice this work will be very simple, but it should on no account be neglected at any time, but regularly and systematically attended to, and the lateral shoots taken completely out when quite small. Then no other growth can ensue; if it does, it must be removed. At intervals, all up the main stems, there will appear a vigorous bunch of flowers at about 9 inches to 1 foot apart. Now, even the best kinds of tomatoes are in the habit of giving some faulty flowers. Do not allow these to waste the energy of the plants, but take them out with a fine-pointed pair of scissors. This will not be extensive work, but nevertheless should be attended to, and this work will go to the end of the chapter. There will thus be a given number of main stems; and nothing else, absolutely nothing else, should be tolerated for a moment. It will happen that some leaves branch out and become very long: these, too, may be reduced if they crowd each other, taking away one or two pairs of the leaflets. But this must not be overdone, as healthy, vigorous foliage is essential to the plants; but the

tomato produces such a superabundance under good cultivation I never allow the leaves to crowd each other, and even take some away altogether. When the plants have made good progress, and have five or six bunches of developing tomatoes on them, the important question of manuring and feeding comes in.

MANURING.

The time has now arrived to give the plants a heavy mulch of thoroughly rotten manure available as immediate plant food. The roots will very speedily come for this manure, and eventually fill it with a regular network of roots. It should be laid on 3 or 4 inches thick; and as more and more tomatoes are produced, this manure will be of the greatest possible value. Should the plants become in any way dryish, give a good soaking of water, or better still weak liquid manure, and have the manure slightly trodden at the same time in order that the goodness may be squeezed out; and should the weather continue rainless, the plants may be watered once a week in a similar way. Treated in this way the manure immediately becomes available for the fruit, and practically that alone; and this method will be found far superior in results to heavily manuring the ground in the first place, which is mainly provocative of a rampant growth that serves no purpose, but on the contrary produces long jointed growth, and demands a great deal of extra pruning. These are the two great factors in successful tomato culture—namely, a rigid system of pruning and strict confinement to main stems, and powerful manuring expressly and solely for the benefit of the fruit as distinguished from the plant itself; and by this method, moreover, the fruit ripens in regular order, commencing from the bottom, and continuing upwards until the plants become no longer profitable. A most important point is to see that the manure is of real value and very thoroughly decomposed. In proportion as it is, so will be seen its effect on the character of the fruits.

A CALCULATION.

Now, estimates are proverbially dangerous things—like prophecies very much; but I am going to venture on a modest one, that is for certain within the practicable, provided this method of culture is faithfully carried out; and we will carry the quoted example through: a plot of land 50 by 100 feet; plants or single stems, total number 1,600 at 3 by 1 foot planting; five seers of tomatoes per plant—and all of the finest quality be it noted; five by 1,600—8,000 seers of tomatoes—at 4 annas per seer, gives 2,000 rupees. But I have in mind that my readers are not ready-made experts. There is much of routine only possible from keen enthusiastic experience, and so I'll reduce this estimate for the planter and the amateur by 50 per cent.—that is, the yield—and call it $2\frac{1}{2}$ seers per plant at 1,000 rupees. Now, I am absolutely at a loss to know how the grower is going to spend 500 rupees by way of expenditure on this culture and everything connected with it to the sale of the produce, but it is conceivable he may do so. Still he has cent. per cent. profit, and that should satisfy the most exacting. This is exclusively applicable to the plains. I would here warn the hill gardener against any heavy speculation in tomatoes, because he has to grow through the monsoon season, and that is quite another thing, as I happen to know to my own cost very dearly.

EXAMPLE.

In 1897 I was going to make a small fortune, and had 4,000 plants all grown as detailed here. They got through the rains pretty well, until nearing the end of September, and hung like ropes of onions, to the extent of very many maunds; hundreds of the fruits weighing over 1 lb. each, of faultless shape, and with the colour just developing in all directions. Then there came quite unexpectedly over 1 foot of rain in twenty-four hours, and I was congratulating myself on how well they had stood the downpour, when, lo! on the third day, black spots appeared; on the next day it had developed 50 per cent., and ere a week was up the entire crop was an absolute mass of disease—a total failure and a dead loss.

CONCLUSION.

Like the potato, the tomato plant will not thrive in a wet or swampy soil, neither is excessive moisture at any time a blessing. It delights in a well-drained friable, easily worked soil abounding in potash salts. It may not be generally known that tomatoes are excellent things for cleaning metal with, and taking out stains, &c., due to the potash absorbed by the fruits from the soil. I should suppose, too, that it is the potash they contain that accounts for their excellent action on the system, at least to a considerable extent. It is, therefore, an excellent medicine and delicious food, far too little understood and appreciated in this country, and should, I venture to think, be recommended and extended in its culture everywhere, seeing, as I have endeavoured to show, that it could be produced on the plains above all places in quantity and quality, and very far from being a non-profitable crop if the best form of culture is once understood.

[It has been recommended by Queensland growers to erect a framework over the plant, cover this with wire netting, and train the plant through the meshes. The fruit will then lie on the netting, which should be about 18 inches above the ground.—Ed. *Q.A.J.*]

5 Seers = $10\frac{5}{7}$ lb.; 1 Maund = 25 lb.; 1 Rupee = 1s. $4\frac{1}{2}$d; 1 Anna = 1d.

PICKLING WHEAT.

A South Australian farmer says:—Having during the last four years watched very closely the effect of pickling wheat as a preventive of bunt, I am convinced that to receive the full benefit of pickling it is necessary to pickle at least a month before sowing, to allow the wheat to thoroughly dry, and to give the bluestone time to kill the germ of the smut before the wheat is sown; for I believe that sowing wheat before it is thoroughly dry causes bunt rather than prevents it, for I have never seen bunt in wheat that has been allowed to stand a month after pickling before sowing, even though the crops around it were badly affected. Three years ago two farmers adjoining me bought wheat out of the same stack, and sowed it at the same time under exactly the same conditions, only that one farmer pickled a month before sowing while the other only a few days, with the result that when harvest time came the crop where the seed was pickled some time before sowing was perfectly free from smut, while the crop that was only pickled a few days before sowing was very badly affected. As Steinwedel seems much inclined to smut, it needs pickling much oftener. I have been growing Steinwedel since 1891, and I have always pickled with the exception of one year, in 1898. I did not then pickle, and what I grew that year was fully one-third smut. Now, several said if I sowed smutty wheat I would grow smut, but I pickled it six weeks before sowing, with the result that I grew a crop perfectly free from it.

POTATO EXPERIMENTS IN SOUTH AUSTRALIA.

Mr. W. L. Summers, Inspector of Fertilisers, writes as follows in the *South Australian Journal of Agriculture*:—

Last season several of our public school teachers carried out experiments in the cultivation of potatoes under suggestions from the writer, in some cases seed and manure being supplied by the Department of Agriculture. Owing to the frosty weather in October and November, and the dryness following, the results were not altogether satisfactory, but a few notes from reports of two of the teachers will be of interest.

Mr. T. G. Roberts, of Aldgate School, had about ten manured plots 16 feet by 25 feet, the rows being 2 feet apart, and the potatoes 1 foot apart in the rows. Owing to unforeseen circumstances, the results were too variable to permit of fair comparison of the effects of the different fertilisers used. The

idea of the tests was to ascertain which form of phosphate was best for this particular locality, and also to note the effects of nitrogen and potash being given in addition to the phosphate. The largest return was obtained from a plot manured with 6 lb. bonedust, the yield being 112 lb. The plot manured with 3 lb. bonedust, 2½ lb. of super., 2 lb. nitrate of soda, and 1½ lb. muriate of potash, yielded 109 lb.; while the plot receiving 6 lb. of bonedust and 1½ lb. muriate of potash yielded 100 lb. When both quality and quantity were taken into account, the two latter were decidedly superior to the plot manured with bonedust alone.

Mr. J. Jacobs, of Mount Schanck School, carried out tests in manuring, and with new varieties of potatoes raised from setts imported by the Chairman of Central Bureau (Mr. F. Krichauff) from Germany. Here again conditions were against a satisfactory test, the plants being cut two or three times by frost; once, when about 9 inches high, they were cut right down. The soil is strongly volcanic at the foot of Mount Schanck, is extremely light, loose, and dry, and being low is also very frosty. The plots were small, and half received manure at rate of 600 lb. super. and 200 lb. sulphate of ammonia per acre, besides a good dressing of wood ashes. The setts were planted on 25th August, and dug on 5th March. The following table shows the results, the manured plot in each case being marked F:—

Variety.	Weight of Setts.	Marketable Potatoes.		Small Potatoes.		Remarks.
		Per Plot.	Average per Acre.	Per Plot.	Average per Acre.	
	Lb.	Lb.	Tons.	Lb.	Tons.	
Eyth—F	¾	3	1·85	4	2·36	Pink skin, very nice shape, but straggly
Ditto	1¾	2½	1·54	4½	2·77	
Prof. Maercker—F ...	¾	5½	3·96	1	0·72	White potato.
Ditto...	¾	4	2·88	2	1·44	
Wohltmann—F ...	1¾	8	4·93	3	1·84	Pink.
Ditto...	1¾	7	3·78	4	2·16	
Korn—F	2¾	9	6·48	3½	2·52	White.
Ditto...	2¾	3½	3·02	2½	2·15	
Ehlers—F	1	9¼	7·99	1½	0·43	White, very good.
Ditto...	1	8	5·76	1	0·72	
Thiele—F	¾	10¾	6·63	1	0·71	White.
Ditto...	¾	6	3·07	1	0·71	
Gratia—F	¾	6	4·32	5	3·6	Pink, roots intersected.
Ditto...	¾	4	2·88	3½	2·52	

It will be noticed that in every case the fertilised plots yielded more marketable potatoes than the unmanured, while the proportion of small potatoes was less. Taking the total of the whole plots, those fertilised yielded 51½ lb. good potatoes and 18 lb. small, against 35 lb. good and 18½ lb. small from the plots not fertilised. Of the varieties, Ehlers, Korn, and Thiele gave far the best results, and, with the exception of Eyth, the results were all above this season's average for the district. The tubers were all shapely and free from scab. Red Skin and Brown River potatoes were tried in small plots with and without wood ashes, the result being that the plots without the ashes did slightly better than those so treated.

GROWING POTATOES ON THE SURFACE.

SOME months ago a gentleman was removing a heap of dry couch-grass from a corner of his garden, and in the centre of it he found a very large sweet potato. With respect to the ordinary or English potato, very good crops can be raised without putting the sett underground. The tuber itself is not the root of the plant, but merely an excrescence which contains plant food. The roots themselves, which are fibrous and branched, are produced below the tubers, and,

provided they have a suitable soil to enter, the plant will flourish and tubers will be produced if certain conditions are observed. The *South Australian Journal of Agriculture* records that the late Mr. G. S. Fowler, on several occasions, grew good crops of potatoes by a similar method to that here described :—

Break up the soil, and work it down fine, manuring it with stable manure or chemical fertilisers. Plant the setts on the surface, and press them into the soil until half buried, or just cover them with light soil; then cover the plot with straw, grass, or similar material to depth of 2 feet to 3 feet, and keep it moist. The potato stems will grow up through the straw, &c, and produce tubers in the lower layers. The straw must be kept moist. An old method of producing a constant supply of tubers is described as follows: —Place the setts about 6 inches apart each way, build round the plot a pen with rails several inches apart, cover with straw to depth of 3 feet or more, and throw over it a few buckets of water occasionally. The tubers produced can be removed as far as the arm will reach through the crevices from time to time without seriously disturbing the plants. A large quantity of smooth, clean potatoes of good quality can be raised on a comparatively small area by this means.

BARLEY-GROWING FOR MALTING PURPOSES.

By F. J. PATERSON,
Queensland Malting Company, Limited.

TIME FOR SOWING.

No doubt every barley-grower has his own theories and opinions as to the correct method of growing barley, but possibly the following may be of interest to intending growers :—

The question is often asked: "What is the best time for sowing?" To this question the answer seems to be: "There is no golden rule, as it depends entirely on the seasons." But, from careful information from those growers who had good crops during the season of 1899, the best results were obtained from sowings between the middle of May and the middle of June. The sowings outside of those dates were mostly failures, and the conclusion I have arrived at may be summed up in a few words: "No matter what time barley is sown, see that it ripens about the first week in November."

Many farmers will say: "If rain comes in April, it is better to put the seed in then than run the risk of rain not coming in May or June." This, no doubt, is correct, but, if sown in April, it must of necessity ripen earlier than if sown in May, and it is for early sowing that the remark, "Make it ripen in November," refers to; and the way in which this may be done is by feeding off with sheep till, say, the first week in June, or by running the machine over the crop. Feeding off with sheep seems to be the best course, on account of its economy in feeding the sheep. Now for the reason why. During the 1899 season the caterpillar plague visited many parts of the Downs, and nearly if not quite destroyed the early-sown barley, or that barley which would have ripened in the beginning of October. A short account of the caterpillar may not be out of place here, and, being information obtained from Mr. Tryon, the entomologist of the Agricultural Department, and partly from my own observation, the facts, so far as the 1899 season is concerned, may be taken as fairly accurate. After the caterpillar emerges from the chrysalis in the ground, about the latter end of November, when the thunderstorm season commences, and changes into the moth, the latter, in turn, lays its eggs, and the eggs come out as caterpillars, and the caterpillar, after living his life, turns into the chrysalis, to repeat the routine. During the rainy months there may be three or four generations, the number depending on the duration of the wet weather; but suppose the wet season to end in March, the last generation of the caterpillar comes out from the chrysalis and remains in a lethargic state during

the winter, just existing, making very little growth until the weather commences to get warm, when it grows very fast; but it must go into the chrysalis stage again in order that the latter may produce the moth in, say, November, and the time when the caterpillar must go into the chrysalis stage is early in October; and it is just before this stage that it is most destructive, attacking not only the foliage but the grain itself. My own observation shows that, while destructive at all times, it does not like its food particularly green, and will always attack the more ripened portion of the crop in preference. Briefly summarising the foregoing facts, it would tend to show that the caterpillar disappears some time early in October, and the crop, if made to ripen in November, is in a fairly green state in October, and the damage from the caterpillar would be considerably minimised. It would, perhaps, be interesting to many readers to show further the life history of the caterpillar, but, as this is an article on barley-growing, space in your *Journal* forbids.

The remaining reason—why the crop is better ripening in November—is one that is, let us hope, remote, but should be taken into consideration. I refer to the frosts which occurred on the first days of October, 1899. Most of the crops were in a forward state and suffered accordingly.

It is a great risk to sow after the end of June. Firstly, on account of the possibility of dry weather; and, secondly, the crop will ripen too late, as the strong sun in the latter end of November seems to shrivel the grain when ripening.

WHAT SEED TO SOW.

Many growers assert that screenings of barley, or inferior barley, are good enough for seed, and base their assertion on the fact that at some time or other a good crop has been reaped from inferior seed. This may be so, but, as a general rule, the best obtainable seed should be sown; it is false economy to buy cheap or inferior seed.

LAND ON WHICH TO SOW.

On making inquiry of the growers of our best barleys what sort of soil the crop was grown on, the invariable reply was, "Loamy soils." In hot, dry seasons, heavy black soil may produce a good barley, but, generally speaking, barley grown on heavy black soil will produce unkind, steely grain, or, in brewing language, "over-rich in protein bodies" and lacking in starch. Growers can easily see for themselves, in cutting a grain across, whether the inside looks hard or glassy, like a grain of rice, or whether it is a soft white colour, like flour, and mellow; the latter is what the maltster likes, and this result is mostly due to the land on which the grain is grown. Glassiness of the interior of the grain is an indication of the crop having been grown on a soil too rich in nitrogen.

Corduroy lands are not the best for barley, as the crop ripens sooner on the ridges of the corduroy than in the valleys, thus giving an unequal growth, which is never satisfactory to the maltster or to the grower. It is most essential to the maltster for the grain to ripen evenly on the malting floors, as, unless it does so, bad malt will be the result.

TIME TO REAP.

Considerable difference of opinion exists on this point. My own opinion is—Cut it when ripe, and, if anything, err on the side of over-ripeness. Barley cut before it is ripe always grows badly, frequently turns mouldy on the maltster's floor, and has a strong tendency to heat in the stack and store, the grain often showing a burnt end. Such barley may be detected by its shrivelled husk, want of plumpness, and most of all by its greenish colour.

Malt made from under-ripe barley gives an acidity to beer, which brewers strongly object to. It is a difficult matter to advise, on paper, the exact stage at which to cut. If left too long, a hot, strong wind may come, which would

shake a portion of the grain out. On the whole, I consider it best to err on the side of the grain being well ripe. It is like a person asking, "What is the right time to pull a peach or any other fruit?" It is no use pulling at a stage when eating it would cause stomachic trouble, nor, on the other hand, would it do to be left till decay sets in. The happy medium, therefore, seems to be best, but err on the side of over-ripeness, as, though a little may be lost, other things being equal, the price obtained will more than balance the quantity lost, whereas most maltsters will decline to buy a green barley, or, if they buy, it will be at a reduced price.

THRESHING.

This is an important part in the production of suitable barley, and it is desirable that growers should know the main points of the maltster's requirements. Very often the machine is "set too close," thereby either cracking the grain, or, in endeavouring to take the awn off, the barley will be partly skinned. The objection the maltster has to either of these points is that once the grain is injured it is almost an impossibility to prevent such injured grain during malting operations from becoming mouldy or mildewed, and to mouldy malt the brewer has an objection; consequently the maltster, in turn, passes the objection on to the grower, and declines to buy if the grain be much injured. It is a general theory that barley cut with the reaper and binder, and stacked some time before threshing, is the best, as it undergoes some mellowing process in the stack, such process being hard to define as to the reason why, except that it is so; and this brings one to a question often asked—Whether harvesters or strippers would not be equally as good for barley as the reaper and binder. I can only say maltsters prefer it cut with the binder, and stacked. But, looking at the question from another point of view—that of a supply of labour—labour at harvest time is often difficult to obtain on the Downs, as everyone wants labour at the same time. Therefore, in large areas, it may be necessary to harvest with harvesters or strippers; and growers, if they elect to gather the crop this way, must take care the machines are not "set too close." Usually the machine is set the same for barley as for wheat, and what will do for wheat injures barley. The cure for this appears to be in the driving-wheel of the machine. For wheat, the driving-wheel is of as large or of larger diameter than the wheel turning the drum, in order to obtain greater speed. For barley, the driving-wheel should be of less diameter than the wheel on the drum, and the machine driven slower for barley than for wheat.

GRADING.

Judging from the past season, very little care has been taken in the grading of the barley at the place where it should be graded—that is, when passing through the thrashing machine. Either the machines are not able to grade or the grower does not make his contract binding with the owner of the machine to grade the grain in a proper manner. There should be no difficulty in this, as the grain has to be handled then; and growers, if they reflect, must know that if it has to be handled again it costs the maltster something, and that "something" for labour is taken off the growers' price. In addition to this, the maltster looks with an unfavourable eye on a badly graded sample. It is distinctly to the grower's advantage to grade well, as he will get a better price, and save railage on screenings and labour in screening in the malt-house. It is to be hoped that growers, in their own interests, will pay more attention to this important point in the future. It might pay them to give the thrasher slightly more money for first quality, but they must watch carefully that the screens are set right, and then there will be no danger of the seconds going into the firsts.

I trust the foregoing may be of some use to growers. Barley is a crop which can be produced well on the Downs; and if growers will take note of the time when sown and reaped, the kind of soil sown on, and any other information, and send to a central place the knowledge gained, they will confer an immense advantage on the community in general.

EXTRACTS FROM THE MONTHLY PROGRESS REPORT OF THE BIGGENDEN STATE FARM FOR MARCH, 1900.

THE three first months of 1900 form a record for absence of rain in this district. Never before, since settlement took place here, has a rainy season been known to furnish only—

2·61 in January,
0·40 in February,

with the whole of March dry until the last three days, when 0·77 fell.

In consequence of such dry weather no progress could be made in March with ploughing and other tillage operations.

But good work has been done in the harvesting of the cow pea, maize, and pumpkin crops.

The abundant return given by three of the above is a new tribute paid to the beneficial effect of deep ploughing and thorough cultivation.

This is, perhaps, the more striking from the fact that our soil is far from being of drought-resisting composition, as are our beautiful loams and scrub ridges of the West.

According to Mr. Brünnich's very careful and interesting analysis, it is rich only in humus; it is fair in nitrogen and phosphoric acid; and poor in potash. It contains also too much magnesia for its percentage of lime.

As to our grass paddock, it is poor in everything except potash.

But the main fault of our cultivation paddock is its high percentage of clay (58·22), which makes it very sticky on the implements, and causes it to split in dry weather into wide and deep cracks even after having been subsoiled to depth of 18 inches.

This season we had five acres under black cow pea. Three acres were sown on the 7th of November, 1899, on a piece of subsoiled land which had been thoroughly pulverised and prepared for an orchard.

The seeds, at the rate of 8 lb. per acre, were sown in drills 3 feet apart by means of a Planet Junior hand seed drill so regulated as to drop from one to two seeds 18 inches apart.

The seeds remained dormant for about a fortnight, and only showed over ground on the 21st of November after a good rainfall of 1·40 inch on the 12th.

They came up very evenly, hardly any plant being missed. On the 22nd December, when they were about 6 inches high, they were harrowed with light harrows. Such rough treatment greatly scandalised some of my neighbours, who thought I had irretrievably ruined a most promising crop. The result, however, justified my expectations—not theirs. The operation did not injure a single plant of cow pea; but it destroyed every little weed, loosened the earth round the roots, and made of the soil a nice layer of mulch 2 and 3 inches thick. A vigorous growth was our reward.

On the 3rd January the crop was again gone over with a Planet Junior hoe and scarifier, after which it took hold of the whole field, which, at a distance, had the look of a field of lucerne, not a single spot being left uncovered.

Flowering took place in the second week in January; and by the middle of February the plants were well loaded with ripe pods, although the crop was not so heavy as would have been the case had the season been more propitious. The harvesting began on the 27th of February.

The operation leaves yet much to be desired, as no machine, that I know of, is yet in existence to simplify the work. It should not be difficult, however, for an engineering genius to invent a suitable one, in which case he would render an invaluable service to the Queensland farmers.

The problem consists in combining three knives or cutters, one cutting vertically in front all the entangled vines, whilst two lateral knives would cut horizontally the stems near the roots along the rows.

So far, one must do the best he can with hand labour only.

The following implements have been tried by us with about equal success :—A scythe, a reaping hook, a sharp hoe, and an adze. By means of any of them a good man who has got the knack can cut about one acre a day, which is not so bad after all.

We left the crop to dry for from three to four days on the ground.

As I had to stack them out of doors, I found it advisable to let them get thoroughly dry, which caused the loss of a good many leaves—unfortunately, the best part of the plant for chaff. Could I have stacked them in a shed, I would have had no hesitation in getting them in in a less dry state. In that case the fermentation of the stack would have been more intense, without risk of mouldiness, as is the case when a stack composed of highly absorbent material is exposed to the full effect of an air sometimes heavily saturated with moisture.

The other two acres were sown in a similar manner immediately after the wheat had been harvested on land freshly ploughed 6 inches deep, but not subsoiled. They were subsequently treated in the same manner as the above three acres.

Half of them, sown on the 22nd November, had the benefit of a few points of rain. They developed well, and gave a fair crop of both vines and beans, although the field was far from being entirely covered. The other half, sown only a week afterwards (1st December), had no moisture to assist germination. For over five weeks the seed remained dormant in the ground, and came up only in January, very unevenly. From this patch we had barely a load of hay without any beans worth mentioning. Thus our stock of from 8 to 10 tons is the return of the first four acres.

Notwithstanding the adverse season, I expect a return of from 10 to 15 bushels of beans per acre, which at 9s. to 10s. a bushel should prove remunerative, without counting a good provision of excellent chaff for our horses.

In a subsequent report I intend to give full cost of production of crop and of its marketable return. But already it can be safely affirmed that it is one of our surest and most profitable crops.

Of maize, we had about three acres sown with Golden King and Early Mastodon. The rows were 4 feet 6 inches apart, and the plants about 18 inches apart in the row. Every fifth row was left empty to receive pumpkins and other Cucurbitaceæ. It has been objected that our corn was too far apart. The result has, however, given us ample justification. A few fields, not far from here, situated on very similar land and extremely carefully planted and well tilled, gave a return by half less than ours, although the plants are there twice as numerous as in our field. It must never be forgotten that a good well-grown cob is worth half-a-dozen starved nubbins.

We have also other varieties sown on a small scale, such as Ninety Day, Early Yellow Flint, Early French, Red Nibbed, Silver Mine, &c. They did well, too, but none equalled the Golden King and the Early Mastodon—in fact, those two last varieties did so well, notwithstanding the adverse season, that I intend to exhibit them against any grown in Queensland for both excellence of grain and perfection of cobs.

As to the pumpkins grown between the rows, they were not numerous, but of a pretty large size, many turning the scale at from 40 to 60 lb.

CARE OF IMPLEMENTS.

By S. C. VOLLER

It may safely be said that the main object of the fruitgrower or farmer is to make as much as he can off his place.

It may also be safely said that one of the best aids to the accomplishment of this object is the avoidance of loss or waste. It is not always what a man makes that tells up in the long run, but what he saves. He may make thousands, but he may waste thousands, and thus be no better off. I often

think, as I go about the country, of the need which undoubtedly exists for the exercise of an intelligent saving care on the part of fruitgrowers and farmers of the implements they use in their work. Right here occurs a very important point of possible loss or possible saving—one of the many things which go far to make the tiller of the soil better off or worse off in the end. One cannot help feeling all possible sympathy for those who settle on the land, when one understands what is involved of hard graft, constant perseverance, anxious waiting for developments, frequent uncertainty as to results owing to untoward seasons, with now and then absolute loss; and further, even when things get into shape and go right, the everlasting battle with innumerable enemies of various kinds.

Sympathy! Yes; because the man on the soil runs risks frequently that are very real, and I think he deserves every possible success, and I am always pleased when I see him succeeding. But the intelligent cultivator will be always on the lookout for means to reduce his risks or losses, and add to his profits, and my idea now is to show a good many how they can do this by taking more care of the farm and orchard implements than is usually done.

More waste and loss occur in Queensland annually by neglect of implements and machinery than many people would feel inclined to believe. The majority of our settlers would not believe it if the thing were put in fair figures showing the value of such loss. But the loss occurs, nevertheless, and is going on at this moment.

I can sympathise with a farmer when a drought prevents him getting any crops, or a big frost cuts his wheat all to pieces, because he is losing, and he knows it and I know it.

But what are we to say when the same farmer has a valuable reaper and binder standing out in all weathers for months together; or mowing machines and cultivators acting as henroosts with only one possible result; or ploughs, harrows, &c., left about the farm where they were used last? He's *losing* and does not seem to know it, but he will find out.

I can understand a fruitgrower complaining of his loss through fruit fly, scale pests, flying foxes, birds, &c., because it is a loss and he knows it; but isn't it rather funny to find a man who works hard against these things to *avoid loss*, and who will fight his sawmiller over the price of cases, and argue with his storekeeper about the price of the very nails he uses to put these cases together, leaving Planet Juniors, ploughs, disc-harrows, hoes, spades, forks, &c., out in all weathers month after month, being satisfied to fling them under an orange-tree or lean them up against the fence?

What is the result? He loses, only he doesn't seem to see it. He can't afford to lose a shilling or two on nails or cases, but he will let ten or fifteen pounds' worth of tools go to ruin! This sort of thing is going on all over the country. Go to some places, and if you want an axe to cut a stick with you are introduced to a rusty-headed affair with doubtful edge, and weather-beaten and oftentimes split handle, and loose at that! Now, what does this all mean? To my mind it means that there is dreadful want of thought somewhere. It does not pay people to allow this sort of thing to go on. Not alone is there the actual loss through deterioration, but there is the discomfort of working with tools and implements all out of order. Fancy trying to work with implements whose joints are all loose, woodwork dried up and splitting, and ironwork all plugged up with rust.

How nice to go out to work with things that you know will be out of gear all day long!

What pleasure it is to go round hunting things up, and putting things together, and find this wants fixing, or that wants mending, or something else has gone altogether! I've no sympathy for the man who mismanages things in this fashion, and he does not deserve much.

Now, my advice is—put up a shelter, as good as you can afford, but put up one of some sort right away for your implements and tools, and see that everything is kept there when not in actual use. Follow this up, and encourage your boys and girls to do likewise, as well as your employees if you have any.

Then, in addition to keeping things under cover, take some convenient season now and then for a thorough overhauling, cleaning, greasing, or oiling, and even painting. There is many a wet day or odd time when much of this kind of work can be done. When new handles are got for hoes, axes, &c., grease or oil them before using, and frequently while in use.

The result will be a saving of what is, at present, a big loss in many places, and an enormous increase of comfort in work. Good work cannot be done with bad implements, and there is no reason why people should be every now and then confronted with the necessity for purchasing some new implement when a little care will prevent this. Neither is it fair to condemn the makers of implements because their machines and tools will not stand the unnatural abuse and neglect we often subject them to.

QUEENSLAND AGRICULTURAL COLLEGE.

Particulars as to Experimental Plots of Potatoes, Planted 2nd March, 1900.

No. of Plot.	Manures Used.	Quantity.	Method of Distribution.	Price.	Remarks.
1. ¼ acre	Ammonium sulphate Superphosphate ... Potassium chloride	lb. 56 84 56	... Placed in drills	per cwt. 10s. 4s. 6d. 14s. 6d.	Previous crops:—Maize, stud wheats, and oats.
2. ¼ acre	Wood ash ... ... Ammonium sulphate	140 28	... Placed in drills	...	Previous crops:—Maize, stud wheats, and oats.
3. ¼ acre ...	Bonedust	224	Placed in drills ...	3s. 6d.	Previous crops:—Maize, stud wheats, and oats.
4. ¼ acre ...	Kainit	112	Placed in drills ...	5s.	Previous crops:—Maize, stud wheats, and oats.
5. ¼ acre ...	Potassium chloride ...	56	Placed in drills ...	13s.	Previous crops:—Maize, oats, oats.
6. ¼ acre ...	Filter press cake from sugar-mills	tons. 3½	Ploughed in ...	per ton. 2s.	Previous crops:—Maize, oats, oats.
7. ¼ acre ...	No manure	...	...	...	Previous crops:—Maize, oats, oats.
8. ¼ acre	Ammonium sulphate Bone phosphate ...	lb. 28 196	... Placed in drills ...	per cwt. ... 4s.	Previous crops:—Maize, oats, oats.
9. ¼ acre	Ammonium sulphate Kainit	28 112	... Placed in drills	..	Previous crops:—Maize, oats, oats.
10. ¼ acre ...	Barnyard manure ...	tons. 8	Ploughed in ...	...	Previous crops:—Maize, oats, oats.

The land was ploughed twice to a depth of 6 inches on each occasion. The potatoes were planted in drills 3 feet apart, and 3 feet between each set in the rows. The manures, with the exception of the filter press cake and the barnyard manure, were placed in the drills. The filter press cake and the barnyard manure were spread over the land and ploughed in. On 24th March the potatoes were up, and very little difference is noticeable in the various plots. All plots were planted on the same day.

Dairying.

MANGELS *V.* SUGAR BEETS FOR MILK PRODUCTION.

CHEMICAL analyses show that sugar beets contain a lower percentage of water and a higher percentage of nutritive material than mangels. The main difference in nutritive material, however, is in connection with the fat and heat producing substances, sugar beets containing more of such substances than mangels. In order to test the comparative value of these two kinds of roots for milk production, two experiments, each with different cows, have been completed, and the results of the two experiments correspond so closely that they are of interest.

In each experiment four cows were used. They were selected from the herd in the dairy department, care being taken to select cows as nearly as possible in the same stage of lactation. After a week's preparatory feeding, during which all the cows were fed the same ration, the rations were changed. Two of the cows were fed 60 lb. of sugar beets per cow per day for two weeks; then they were fed 60 lb. of mangels per cow per day for two weeks. The other two cows were fed 60 lb. of mangels per cow per day during the first two weeks, and then changed to 60 lb. of sugar beets per cow per day during the next two weeks. Thus each experiment lasted four weeks, and each cow was fed two weeks on mangels and two weeks on sugar beets. In addition to the roots, the cows received a meal ration and what clover hay they would eat, each cow receiving like quantities of hay and meal. In the first experiment, the meal ration consisted of equal parts by weight of peas, barley, and oats, and each cow was fed 7 lb. of this mixture per day. During the second experiment, each cow was fed 6 lb. of bran and 2 lb. of pea meal per day.

It might have been a better test of the relative nutritive value of these two foods, had no meal been fed; but the object of these experiments was to test the influence of these foods upon the milk flow when fed as they most likely would be in ordinary practice—namely, in conjunction with a meal ration. This seems to be the main practical point at issue, and the question in which practical men are most interested.

The following condensed table shows the amount of milk produced by each cow on sugar beets and on mangels in each experiment:—

	Milk produced on Sugar Beets.	Milk produced on Mangels.
First Experiment.	Lb.	Lb.
Cow No. 1	306·75	277·50
„ 2	393·75	406·75
„ 3	262·00	272·50
„ 4	305·50	318·75
Total	1,268·00	1,275·50
Second Experiment.		
Cow No. 1	319·00	330·00
„ 2	318·75	326·50
„ 3	273·25	265·25
„ 4	319·25	316·75
Total	1,230·25	1,238·50

COMMENTS.

1. In each experiment there is a slight difference in the total milk yield in favour of the mangels, amounting to 7·50 lb. in one case and 8·25 lb. in the other, in the milk produced by four cows in two weeks.

2. In each experiment, cows 1 and 2 started on sugar beets and finished on mangels, while cows 3 and 4 started on mangels and finished on sugar beets. With this in mind, a study of the table shows that in the first trial cow No. 1 decreased in milk flow, and cow No. 2 increased in milk flow, after being changed from sugar beets to mangels; and that both cows 3 and 4 decreased in milk flow after being changed from mangels to sugar beets. In the second trial, however, all the cows gave more milk during the second two weeks than during the first two, but the cows which were changed from sugar beets to mangels made a greater increase, on the whole, than those which were changed from mangels to sugar beets.

3. Everything considered, these experiments indicate that there is very little, if any, difference between mangels and sugar beets as foods for stimulating the flow of milk. It must be remembered, however, that these trials have no bearing upon the relative values of these foods for maintaining life or producing fat.

4. On the College farm mangels have given much larger yields per acre than sugar beets.—*Bulletin* 110 *of the Ontario Agricultural College.*

ARTIFICIAL REARING OF YOUNG PIGS.

By F. E. H. W. KRICHAUFF, Cor. Mem. R.H.S.

It being too troublesome to give them the bottle, where the sow either died from milk fever or has not as many teats as she has young ones, Mr. Von Kylander constructed an apparatus, which proved effectual, and should be worthy of imitation where the young pigs are of a valuable breed. A box is twice subdivided in the centre. Semi-circular out-cuttings are made in these, against which small pint bottles with the milk are leaned separated from each

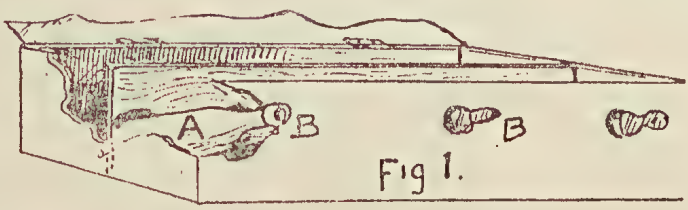


Fig 1.

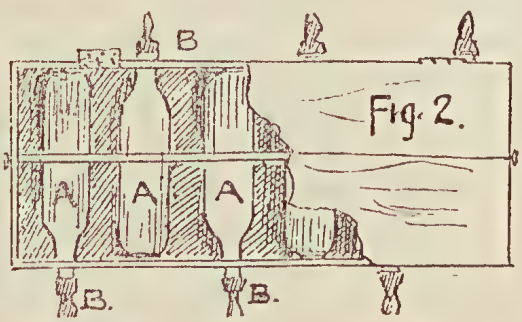


Fig. 2.

other by crossbars. Strong rubber sucking nipples are fixed on the bottles, to which the young pigs soon find their way after they have been held to them a few times. The feeding bottles and nipples must be cleaned each time after use with hot water, and the latter are kept in cold water until again used. The pigs can get at the bottles from two sides, one row of bottles leaning to the

one, the other towards the other side, and thus overturning of the box is pretty well prevented. They must not take too much food at a time, and receive food, therefore, during the first week every half-hour or hour. The proportion is $1\frac{3}{4}$ pints of boiled milk with $3\frac{1}{2}$ pints of water in which 60 grains of oatmeal are boiled. It is given blood warm. In the second week $2\frac{3}{4}$ pints of milk are prepared in the same way, and given every one or two hours. In the third week $3\frac{1}{2}$ pints of milk are added to the above quantity of water and oatmeal every two or three hours. In the fourth week they will feed from a trough filled with a soup made of milk and wheaten flour, and you can give dry, broken maize, oats, or barley, mixed with a little sugar.

CURING PORK ON FARMS.

THERE are two methods of curing the hams, shoulders, and bacon—the brine or the dry salt method. The brine method is used in all the large packing-houses, and probably on the majority of farms, because it is simpler and requires less labour and attention (says a writer in an exchange). The common practice is to immerse the meat in brine for from four to six weeks. Whichever method is used, the hogs should be allowed to cool thoroughly before being cut up. Experience has taught me that many hams are spoiled by being put into the brine before they are thoroughly cooled out. The meat should be kept from freezing, but as cool as possible, for at least twenty-four hours after killing; and forty-eight is better. Select a new barrel or tub, or one which has been previously used for pork, and, after trimming the hams, shoulders, and bacon, weigh and pack tightly. The brine is made as follows:—To every 100 lb. of meat, 7 lb. fine salt, 5 lb. sugar, $1\frac{1}{2}$ oz. saltpetre, and 4 gallons of water. Mix and boil, unless pure, fresh rain water is used, and skim until all dirt or scum is removed. When cooled, pour this brine over meat, on which put a weight to keep it immersed. Should any taint or scum be noticed on the brine after a few days, the meat must be removed and thoroughly washed in clear water, the brine boiled, and the barrel scalded or a new one procured. After ten days or two weeks the meat should be removed and repacked, so that all parts of it may become salted. If a piece of steel or long knife is run in along the bone in the hams and shoulders it will insure uniform salting. For light hams and bacon four weeks of salting is none too long, and for heavy hams and meat that is wanted for keeping through the summer six to eight weeks is required. After the meat has been salted sufficiently, remove from the brine and hang up to dry before starting the smoke. The meat should be lightly sprinkled with black pepper after thoroughly draining. The method of dry-salting is a very satisfactory one, and gives the perfection of fine, sweet, nutty hams. It is commonly employed where one is in a hurry to cure the meat to use, and does not care to buy a barrel or tub to cure a small quantity. The following formula can be fully recommended after giving it a thorough trial:—(1.) The hams are placed in a large tray of fine Liverpool salt, then the flesh surface is sprinkled with finely ground crude saltpetre until the hams are as white as though covered by a moderate frost; or, say, use 3 or 4 lb. of the saltpetre to 1,000 lb. of green hams. (2.) After applying the saltpetre, immediately salt with the Liverpool fine salt, covering well the entire surface. Now pack the hams in the bulk, but not in piles more than 3 feet high. In ordinary weather the hams should remain thus for three days. (3.) Then break the bulk and resalt with fine salt. The hams thus salted and resalted should now remain in salt in bulk one day for each and every pound each ham weighs—that is, 10 lb. ham should remain in ten days, and in such proportion of time for larger and smaller sizes. (4.) Next wash with tepid water until the hams are thoroughly cleaned, and after partially drying rub the entire surface with finely-ground black pepper. (5.) Now the hams should be hung in the smoke-house, and this important operation begun. The smoking should be very gradually and slowly done, salting thirty or forty days. (6.) After the

hams are cured and smoked they should be repeppered to guard against vermin, and then bagged. These hams are improved with age, and are in perfection when one year old. For small lots I have used to 100 lb. meat 6 lb. fine salt, 2 lb. brown sugar, 4 oz. fine saltpetre, and 4 oz. black pepper. Mix thoroughly and rub in well all over the meat and especially around the bones. Repeat this twice at intervals of several days or a week, when the meat will be found to be well salted. Be sure the salt is dry and hot when it is applied, for the meat will take it better than if it is damp. Now comes the smoking, which is fully as important as the curing. Hang the meat in a tight smoke-house; the tighter it is built the quicker and more uniform the smoke will be. I cut the wood in small pieces, and use an old milk pan or iron kettle to hold the fire. Build a fire of shavings and corn cobs, and when well started put on several pieces of wood and cover with another pan or something of the kind. If the cover is set just over the edge, enough draught is caused to make the wood smoulder and smoke without giving out much heat. Never smoke on a windy day, because the wind will drive the smoke to the leeward side of the house. A light, uniform smoke should be maintained until the meat assumes a beautiful, glossy brown; a heavy dark-brown is not desired. This will take from four days to a month, depending on the quantity of meat and the tightness of the house. Meat cured and smoked as above described will be sweet, juicy, and keep well, and if it is the proper kind at killing time will be found the perfection of excellence.—*Town and Country Journal.*

CARE OF THE SEPARATOR

Of the large quantity of separators used on farms, there are many looked after and worked in a very slipshod sort of fashion. We have come across separators out of use and thought worn out, which have simply become clogged up with dirt, and on this account alone unworkable. Now, using a separator after this fashion is a serious matter, and means considerable loss, besides inconvenience in having to revert to the shallow-pan system of creaming, which to those having once separated milk by centrifugal force is too old-fashioned, causing extra labour and space for its carrying out.

The loss principally experienced is found in having to return the machine to the maker (as thought for repairs), but a large proportion are simply thoroughly cleaned and returned.

In using a separator, the first point to be observed to ensure perfect separation is that of heating the milk to the proper temperature. If it can be separated straight from the cow, so much the better, as the temperature is about right, and the milk will require no heating up, which is a somewhat tedious operation when it has to be performed by immersing the pails in hot water to raise it. Of course it is not always practicable to separate the milk as soon as obtained, as this would entail separating twice daily, which is not necessary for butter-making purposes, and only needed where there is a sale for fresh cream.

It is well never to separate under a temperature of 86 degrees Fahr., and the higher above this point the better, the cleanest skimming being obtained at pasteurising heat—namely, 160 degrees Fahr. to 170 degrees Fahr. If the milk can be put through at a temperature of 100 degrees, so much the better, but it is important to evenly regulate the temperature of all the milk to the point at which it is decided to separate. Up to 115 degrees Fahr. the lactic ferment is in no way injured, and the cream will ripen naturally, but above this point addition of starter or sour buttermilk, &c., although not essential, will be best for the proper ripening of cream and success in butter-making. Straining milk is an important feature. All milk put into the feeding vat should be thoroughly strained, as bits of straw passing into the bowl of the machine, although not passing into the milk or cream, get held up in the separator slime, and all helps to clog and interfere with the proper working. Granted that the milk when milked is strained through the ordinary wire strainer, a piece of muslin answers very well for putting over the feed vat into which the milk is placed.

Speed is the next item which it is of the greatest importance to regulate. Even with a proper temperature, where the speed is too low, inefficient separation is sure to be the result.

The speed required, which is, of course, applied to the milk in the form of centrifugal force (a force flying outwards and tending to void a centre), varies somewhat with different makes of machines Generally, the bowl is required to revolve at a pace of 5,000 to 6,000 times per minute. For this purpose various device wheels are used to reduce the number of revolutions to be made at the handle by the person turning the separator to about fifty or sixty. The maker will usually state with a machine the number of turns of the handle required to give the full and proper speed. In getting up the speed of a machine when starting, it must be done very slowly and gradually. The bowl is best filled with a little warm water at the commencement, which, besides warming it ready for the milk, prevents the vibration and consequent wearing of bearings likely to occur in the case of an empty bowl. Seeing, then, that a larger proportion of fat is lost in the separated milk when the speed is too low than is necessary, the milk should only start to be admitted when full speed is attained.

This also points to evenness of speed being a great desideratum dropping the speed because the arm aches furiously is certainly excusable in one way, and yet not in another. As certain parts of a separator are liable to wear, these parts require well oiling.

Thoroughly oiled with a good oil, their lives may be prolonged considerably; these wearable bearings, &c., may be renewed by the user, if possessed of a fair amount of skill, when they are worn out, which should not often be the case where the machine is carefully handled and well oiled.

Good oil may be described as containing no acid substances liable to act on the surfaces it is used to lubricate, and is sufficiently fluid to run, and yet must not be too thin, or, on the other hand, too viscid.

It is impossible to set down the actual working years of a separator; so much depends on how it is used.

The causes of separators working unevenly and shaking are many. A few of the most important might, however, be enumerated:—

(1) Irregular inflow of milk.
(2) Power applied unevenly.
(3) Foundation not solid.
(4) Bearings worn, &c.

For those farmers in a large enough way, to my mind a boiler and turbine separator is a very good investment. Separation is performed by a jet of steam, which, being regular, is more likely to give results nearing to perfection than is the case when the power is applied by hand.

Also, by means of a jacketed feed vat, or, if it can be afforded, a Pasteuriser, the milk can be warmed to an even temperature by steam from the boiler. A plentiful supply of hot water and steam for washing up and scalding utensils is also always to hand, which is a great boon, steam knocking spots off most bacteria which may lurk in the pails, &c., if this order of plants has any individual members large enough to be mottled.—*Agricultural Gazette* (London).

PIGS AND THEIR MANAGEMENT.—No. 5.

THE following paper on certain diseases of pigs, and the treatment required, was published last January in Bulletin 110 of the Ontario Agricultural College and Experiment Farm, Toronto, and was written by Professor G. E. Day, B.S.A., Professor of Agriculture, in collaboration with Mr. J. Hugo Reed, V.S.

Although we have no severe winter weather in Queensland such as is experienced in Canada, where it is necessary to carefully house live stock, yet

very sharp cold, often accompanied by drizzly wet weather, occurs here, especially on the table lands, where there is little shelter in the way of trees or valleys, and the farmers' stock is therefore just as liable to contract diseases as in the colder countries of the world.

The paper is entitled—

PARTIAL PARALYSIS AND CRIPPLING OF SWINE.

During the winter and early spring months many pigs become affected with a partial paralysis, and others, while apparently not paralysed, become lame from a rheumatic inflammation of the joints.

Symptoms of Paralysis.—Paralysis, while sometimes showing itself suddenly, usually develops gradually.

The pigs show a disinclination and partial inability to come to the trough at feeding time. The appetite is capricious, sometimes they eat fairly well, and at others take very little. The hind limbs are especially affected. Motion apparently causes more or less pain, expressed by squealing, though it is probable that the squealing is not so much indicative of pain as of the inability of the muscular system to obey the will. The symptoms gradually increase in intensity until in many cases, complete paralysis and loss of appetite occur, and death soon follows. In some cases, the symptoms do not undergo marked change for a considerable length of time, and in others a spontaneous cure is effected. Occasionally spontaneous diarrhœa occurs, which is usually followed by recovery.

Symptoms of Rheumatic Affections.—The symptoms of rheumatic affections are much the same as those of paralysis, but are often accompanied by a swelling and evident tenderness of the joints affected. Movement causes considerable pain, and constipation is usually present.

Causes of Paralysis.—Experience indicates that paralysis occurs as a sequel to digestive trouble, and is usually associated with constipation. It commonly occurs among well-fed hogs that are confined in small premises, and hence do not take much exercise. Inaction and liberal feeding cause indigestion, affecting both stomach and intestines; constipation of the bowels follows; and this, through its influence upon the nerves, causes partial paralysis.

Causes of Rheumatic Affections.—The great cause of rheumatism is dampness of the premises. Damp sleeping places or damp walls are extremely injurious to hogs.

Curative Treatment for Partial Paralysis.—The treatment is to produce purgation, reduce the supply of food, and give food that is easily digested. Purgation can be caused by giving in solution from 2 to 8 oz. of Epsom salts, according to the size of the animal. It is also good practice to give in addition 10 to 20 grains nux vomica three times daily to overcome the paralysis of the muscular coats of the stomach and intestines. The latter may be given in the food if the animals will eat. The fluid must be carefully given, because the animal is likely to squeal during its administration, and, if a considerable quantity of fluid be introduced into the mouth while the animal is squealing, some of it will pass down the windpipe into the lungs, either causing death at once or complicating the existing disease with mechanical bronchitis, which will probably prove fatal.

If the disease is noticed in its first stages, it frequently can be overcome by giving the affected animals a complete fast of about twenty-four hours, and then giving them a drink of skim-milk which contains a liberal dose of Epsom salts. Unless they are very thirsty, the animals will likely refuse to take the salts in this way; but, when practicable, the method is much preferable to forcible administration, as it involves no risk.

Curative Treatment for Rheumatic Affections.—About all that can be done for rheumatism is to remove the animal to dry, comfortable quarters, administer a purgative, and feed lightly. Treatment of the diseased limbs does not appear

to be necessary. Removing the cause and acting upon the digestive organs will usually affect a cure, except in well-advanced cases.

Hyphosulphite of soda, a teaspoonful to each animal in its food, is recommended by some, but has not been tested at this institution.

Prevention of Paralysis and Rheumatism.—When animals become sick, it is important to know what to do; but it is infinitely more important to know how to prevent disease. Paralysis and rheumatism may almost invariably be traced to mistakes in feeding, or to unsuitable surroundings. Of course, it is impracticable to describe all the possible ways of successfully feeding and managing swine, and all that can be attempted is to give a few suggestions.

Exercise.—Constipation is practically unknown among hogs that have plenty of exercise. The influence of exercise upon the action of the bowels is so well known that it need not be dwelt upon; and when the bowels move regularly there is little to be feared from paralysis. As far as practicable, therefore, hogs should be encouraged to take exercise; but, unfortunately, exercise is frequently out of the question during the cold winter months.

Feeding.—Where exercise is limited, the skill of the feeder is taxed to the utmost. There is probably no *best* meal ration for the hog—at any rate, it is not known. Generally speaking, the greater the variety of foods the better. But if an exclusive meal ration is fed the danger point is always near, for digestive troubles are liable to occur. Dairy by-products are excellent, and lessen the danger to a considerable extent, but they are not always available. Roots, however, are available on nearly every farm during the winter, and they form an excellent regulator. It is a well-known fact that where hogs have access to pasture they are remarkably free from the evils under discussion, and roots have an action somewhat similar to grass. In our experimental feeding our most thrifty and vigorous hogs have been those which received roots. Our method of feeding roots is very simple. The roots are pulped and mixed with the dry-meal ration, and then the whole mass is moistened with water, milk, or whey, as the case may be. Sugar-beets, mangels, or turnips may be fed in this manner, but potatoes are probably better cooked. Of course the other roots may be cooked if desired, but we have not found it necessary to do so. For growing pigs, three to five months old, we have allowed the roots to constitute as high as 50 per cent. of the weight of the total ration—that is to say, we have fed 1 lb. of roots for every 1 lb. of meal. This may be regarded as extreme root feeding, and the pigs fed in this way were rather thin and did not make rapid gains, but they were remarkably healthy and gained rapidly when the meal ration was increased at a later period. Twenty-five to 30 per cent. of the weight of the total ration may be regarded as a fair proportion of roots. If the animals leave some of the roots it is not necessary to decrease the proportion of roots in the mixture. The difficulty can be overcome by feeding a smaller quantity of the mixture, giving them only what they will eat up clean. In this way the danger of overfeeding is avoided. Roots may be used for all classes of hogs, and the quantity must be regulated by the feeder, who must be guided by the condition of the animals. Some prefer feeding the roots whole, as this give the pigs more exercise.

For feeding sows, or even for younger animals, variety may be given the ration by running some good clover hay through the cutting box, steaming it, and mixing it with the meal ration. An occasional feed of this mixture is much relished, and has a decidedly beneficial effect.

Generally speaking, an effort must be made to avoid overloading the animal's stomach with concentrated food. When hogs run at large during the summer, there is little danger of doing this; but in winter feeding, or in feeding hogs shut in pens, great care is necessary. When hogs are confined in pens during the summer, green foods, such as grass, clover, peas, rape, &c., can be used to advantage.

Correctives.—Under the name "correctives" are included those substances which are not foods, but which have a beneficial action upon the digestive organs. Earth is one of the simplest, though perhaps not the best of these,

It is certain, however, that hogs greatly relish a little fresh earth during confinement. Ashes are also good, mixed with a little salt and kept in boxes where the hogs can get them at will; they are certainly beneficial. Charcoal is excellent, and has a tendency to prevent indigestion. The charcoal may be fed alone or in conjunction with other substances. The following mixture is recommended by the veteran swine-breeder, Theodore Louis: "Take 3 bushels of common charcoal, 8 lb. of salt, 2 quarts of air-slacked lime, 1 bushel of wood ashes. Break the charcoal well down, with shovel or other implement, and thoroughly mix. Then take 1¼ lb. of copperas and dissolve in hot water, and with an ordinary watering-pot sprinkle over the whole mass and again mix thoroughly. Put this mixture into self-feeding boxes, and place them where hogs of all ages can eat of their contents at pleasure." If the droppings of the hogs are of a constipated nature, the following mixture works well: Equal parts by weight of Epsom salts, sulphur, and powdered charcoal. Feed the hogs some of this once daily in their food. The quantity to be given will depend upon the size of the animals, say from a teaspoonful to a dessert-spoonful for each animal, increasing or decreasing the dose according to the condition of the droppings.

The Piggery.—The building is of great importance. Without a suitable piggery, no amount of skill can make a success of swine feeding. To those who contemplate building, a few suggestions may be useful. In the first place, the building *must be dry*—dry walls, dry beds, and, as far as practicable, dry floors. Dampness is one of the great causes of unthrifty and rheumatic pigs, though injudicious feeding will aggravate the evil. Then the pens should be reasonably warm and well ventilated; and, lastly, they should admit the sun freely. The central feed passage with pens on each side is open to grave objections, because the pens on one side of the passage, at least, will receive little or no sun. A building facing the south, with all the pens on the south side and the feed passage on the north, is preferable. No windows need be put in the north side, but a double supply should be put in the south side. If the windows are placed a good distance from the floor, they will amply light the feed passage. With this arrangement, the cold side of the building is tightly sealed against the wind, and every pen receives its share of life-giving sunlight.

Opinions differ widely as to the best material for the walls of a piggery, and it is, perhaps, possible to be too positive in this matter. It seems only fair, however, that the public should be made acquainted with some experience we have had in the experimental feeding department of the College. We have one piggery with concrete walls 1 foot thick, a cement floor, and plank sleeping places for the pigs. We used this pen during two winters, and the results were disastrous. During each winter more than half the pigs became more or less crippled, some of them died, and others were practically worthless. As a summer pen, it has proved quite satisfactory; but for winter feeding, it is a failure. It seems impossible to ventilate this pen without making it too cold. The concrete is a much better conductor of heat than is wood, and it seems to carry away the heat of the pen, condensing moisture upon the walls, and leaving a damp, chilly atmosphere. If artificial heat were used, probably the difficulty could be overcome. It is intended to line the walls with lumber, leaving an air space between the boards and the wall.

Reports are to hand of piggeries with concrete and stone walls which are giving satisfaction, but from what has been stated it will be seen that a concrete piggery may be quite the reverse of satisfactory.

During the past winter, which was exceptionally severe and seems to have occasioned more than ordinary difficulty with regard to crippling, we kept our hogs in a frame building with cement floor and plank sleeping places. The outside of this building is single-boarded with battens over the cracks. On the inside, the walls are double-boarded with tar paper between the two layers. The floors and beds are almost identical with those of the other building. In this pen, we had not a single case of crippling. Our experience, therefore, leads us to prefer wooden walls.

The floors present another serious problem. A cement floor possesses the great advantage of durability; and where wooden platforms are provided for sleeping places, they seem to be very satisfactory. For breeding pens, no doubt wooden floors are safer. If a wooden floor is used, its durability can be increased by laying it on joists about 18 inches above the ground, and having the space below the floor well ventilated. A single thickness of 2-inch plank, laid with water-tight joints, is preferable to a double floor. With a double floor there is more or less danger of moisture collecting between the two layers, in which case drying is slow, and decay rapid. One great objection to wooden floors is the danger of trouble from rats, which may perhaps be lessened by having the space beneath the floor well lighted and ventilated.

There are numerous methods of ventilating piggeries. A plan which we have used, with fairly good results, is to run straight ventilating shafts from the ceiling to a cupola on the roof. The shafts are made of rough lumber, and should be, at least, 2 feet square. In the bottom of the shaft (at the ceiling) is a trapdoor which opens into the shaft. A small rope attached to the top of the trapdoor runs through the side of the shaft and then down through the ceiling, so that by pulling the rope the door can be raised to any degree required. On some days it is much more difficult to secure ventilation than on others, and the large shafts with trapdoors permit of regulating ventilation according to circumstances. Two such ventilating shafts should be sufficient for a pen 50 feet long.

CONCLUSION.

The suggestions which are here offered for consideration are based upon observation and experience. No man is infallible, and no doubt there may be room for difference of opinion on some of the points dealt with; and it is not unlikely that some effective means for preventing and curing paralysis and rheumatism have been omitted. Notwithstanding all this, however, we hope that the thoughts which have been presented may be of assistance to some who have encountered difficulties.

[In drawing attention to a pamphlet on pig-breeding by Mr. Geo. Valder, Principal of the Hawkesbury Agricultural College, we stated (quoting from the *Agricultural Gazette of New South Wales*) that the pamphlet could be obtained by writing to the Department of Agriculture. So many persons have made application to this Department for the publication in question, that we wish to point out that application must be made to the Agricultural Department of New South Wales, not of Queensland.—Ed. *Q.A.J.*]

HINTS ON PIG-KILLING.

THE TOOLS REQUIRED.

THE tools you will require are a sharp knife (if you have not a pole-hammer), any nailing hammer, a scraper with a hook at the back, which is for pulling off the toes, and is useful for lifting the pig, a process explained later; a block or trestle to scald and scrape the pig on, and a piece of rope with a noose tied on. Of course, you will require a man to assist you.

Slip the noose round the top jaw, and let the man hold the pig by it; and while he holds it, hit it on the head with the blunt end of the hammer in the centre of the forehead, a little above the eyes; if you catch him right, he will roll over; this method reduces to a minimum the screaming, which is very annoying.

In the hands of a first-class slaughterman there are very few pigs indeed that get a chance to scream at all. You will now proceed to bleed him. Grasp the top foreleg with the left hand, kneel on the shoulder with the left knee, press the head well back with the right heel, so that the throat is thoroughly

bare and tight; put the point of the knife in a little behind the gullet, and feel your way gently towards the gullet until the blood flows freely; when you have done so, remove your heel and kneel on the pig altogether. If you keep your heel against its jaw and get bitten, it will be a lesson you will not forget.

CLEANING AND DRESSING.

We will now suppose your pig is dead. Cut the division between the nostrils, and meet the cut from underneath the nose. Get a loop with which to lift the pig on the block, which can easily be done by placing the hook of the scraper in the inside of the bottom foreleg and two fingers of the left hand placed through the loop made in the nose. You have now full control over the fore parts. Lift your end on the block, and let your man lift the hind parts. Scalding is the next operation, and the water, of course, should be boiling before you commence killing, and be sure you have enough before you start. Be careful you do not put on your water too hot, or you will over-scald, which is a great deal worse than having the water too cold. If your water is not hot enough to scald, you can add more boiling, but if too hot, and you over-scald, you will not get the skin off at all.

The best plan is to steep the feet first, and when done enough the skin will come off if you rub your hand tightly round the leg. Having got your legs clear, pull off the toes by means of the hook at the back of the scraper; you can now proceed with the side and head, and, when you have got the whole of one side clear with the scraper, swill it with cold water, and shave off with your knife what hairs remain. Now turn your pig over, and proceed as before. When clean all over, cut the sinews in the hind leg to hang up with. When hung up, cut open and take out offal as clean as possible. When all the intestines, &c., are out, wash out with clean water, and let carcass hang a few hours to drain before splitting down the back.

I shall not go into the various methods of cutting up here, because there are so many different systems of doing it that a book could be written on that alone. Further, I have not written this article to make everyone a full-fledged butcher, but simply to assist when in trouble, and in many cases save a few pounds by timely slaughter, thereby making the meat marketable. I advise readers to get a butcher to do it, if possible, for the extra outlay is repaid by the efficient manner in which it will be done; but if no butcher can be got, do it yourself.

SCALDING PIGS.

A great many people put a little washing soda in their tub, to slip the skin easier, and the slightest presence of the two will give a green tint. In tub scalding, I think the safest method is to pull the ears, as they are the first part to scald. If the skin comes off immediately the pig is put in, your water is too hot. Then put in a bucket of cold. The time it takes to steep varies considerably, especially when we have a great amount of hair on. Some pigs—like what we call the Dundalks, a black and white pig from Ireland—require very little, having scarcely a hair on, and very fine in texture of skin. Two men killed five of the above breed, without unnecessary push, in one hour.

It is important to have the hot water for scalding pigs at the proper temperature. A correspondent of a farming paper says: "I have for years employed a test which I once saw recommended in an American periodical, and which some of your readers may doubtless be interested in. It is as follows:—Before immersing the carcass in the tank or other vessel in which the scalding is to take place, take a little particle of its clotted blood and throw it into the water. If the blood immediately assumes a whitish-green tinge, the water is too hot; but if the blood in dissolving retains its crimson colour in the water for about two seconds before it takes the greenish hue, the water is at its best heat, and an excellent scald will be obtained by at once plunging the animal into the

water, and allowing it to remain there for six to eight minutes. If the blood when cast into the water retains its natural colour for any length of time it will be found that the water is not hot enough."

PIGS should be always killed quietly as possible, especially in the hot weather, to help the curing. If you have two or three or a half-dozen pigs together and to kill them the same day, the best way is to have a killing-pen close beside the stye, quietly run one out, take your gun and shoot it behind the ear with a small ball, which will not injure the head for use. As soon as the pig falls, have your knife ready, turn the pig up on its back and stick it. The pig not being excited will bleed well. Choose cool weather for killing; avoid close or thundery weather. Great care should be taken to get the water at the right heat for scalding; it is better to have it too cold than too hot, for a pig over-scalded is very hard to clean. The water should be 150 degrees Fahr.; if the wind is very cold it is a good plan to put a piece of hessian or bran bag over the pig and pour the water over the bag or hessian. Let the pig hang all night, and cut down when cold, very early in the morning. In summer time get it into salt before the flies are about. If you are making bacon for market, cut it into middles, hams, and shoulders; see that the hams are a good shape, leaving the leg bone fairly long, so as to be able to dress it for the table; keep the shoulders for the home use; dealers do not care to give the same for shoulders as for middles and hams, and it will not pay to take less where there is a family. For salting I have a tank built of bricks and cement, measuring 2 feet 6 inches by 6 feet, and 2 feet deep, with a well in the bottom so as to be able to dip out the brine, and a frame made of wood with very fine net wire stretched over it to keep the flies out. It is built in my cellar, and keeps at 60 degrees to 70 degrees Fahr. in the hottest weather. It will hold six pigs at the time. I am in favour of dry-salting for a pig weighing eight to ten score pounds. Use not more than 6 lb. fine salt, 4 oz. saltpetere, 1 lb. white sugar. Rub the salt well in, especially on the outside or rind. Bacon should be turned every day for the first four or five days, and should not lie in salt longer than fourteen days; than take it out, lay it on a slanting bench, and with a cloth and cold water wash off every particle of salt; then hang it up for a few days till dry; when dry put it into the smoke-house. This should be from 12 feet to 20 feet from the fireplace, so that the smoke shall be both dry and cool. The best material for smoking is sawdust and a little wood. Do not smoke the bacon too dark; let it be a pale colour. Two days with the smoke kept well up is sufficient.

PIG-STICKING AS PRACTISED IN AUSTRALASIA.

THE *Otago Witness* thus describes the system of pig-killing as practised in New Zealand:—

Having caught the pig and secured it by slipping a noose round its top jaw and behind the tusks, and another noose around its hind leg, the next thing is to stick it properly, so as to cause sufficient bleeding and avoid "knifing" the meat. Unless a man is pretty expert in the sticking business, his best plan is to stun it by giving a sharp blow with a hammer in the centre of the forehead; and if this is done smartly the pig will drop like a "pithed" bullock." Now catch hold of the upper foreleg with the left hand (the pig lying on its side), kneel on the shoulder with the left knee, press the head well back with the heel, so that the throat is thoroughly bare and tight; put the point of the knife in a little behind the gullet, and feel your way gently towards the gullet with the knife until the blood gushes out freely. Then remove the heel, and kneel on the pig altogether for a few moments. Some killers do not stun the pig, but prefer to have the head held up in a perpendicular position; and it does not matter in the least how the sticking is done so long as the result is satisfactory.

The pig being dead, cut a slit through the nose to make a loop wherewith to lift that end of the carcass. The scalding is an operation that requires practice and judgment, especially with regard to the correct temperature. The water should be made to boil, and then reduced to the right heat. It is very bad to have the water too hot, so as to over-scald, while, if it be too cool, then it can be brought to the right temperature by adding boiling water. If the water over-scalds, it is difficult to get the skin off at all. Small and medium-sized pigs can be scalded in a tub or trough, but very heavy are best done on a grating or trestle by pouring on the water and dipping the feet into a can of water. Singeing is rarely done nowadays, but it used to be frequently adopted with large and coarse pigs. The skin is first thoroughly wetted, and then covered with a thin layer of dry straw, which is fired while the pig lies on the grass or on a paved floor. The heat of the burning straw (old bags or sacking do as well) causes the moisture on the skin to turn to steam, and is really another method of scalding. If the heat is rightly regulated, the hair and outer skin can then be scraped off, and the dressed carcass has a rich brown appearance. Though it would not answer for the pork butchers, it does very well for the family use.

HOW TO DOSE A PIG.

Fortunately pigs do not often require drenching, as the operation is very troublesome to manage satisfactorily, the patient being both strong and obstinate, to say nothing of the great amount of noise incident to the occasion. The above illustration indicates a method of operation, and particularly of the way of carrying it out. The plan appears to be practicable and safe, and is thus explained in the *Australasian* :—

The following is a simple, easy, and comparatively safe way of giving a drench. Take an ordinary pig-catching cord—that is, a cord having either a loop or a ring at one end, put the other end through the loop or ring, and so form a noose; slip this noose into the pig's mouth, taking care to get it well over the tusks; put the free end over a beam or through a ring, and pull up the pig's nose sufficiently high to allow the fluid to run towards the throat, but be very careful not to pull the pig off its forelegs, for if this be done it is almost sure to choke. Then take an ordinary cow's horn, such as is used for drenching horses and cows; pour the medicine into this, force just the edge of it into the mouth between the teeth; then slightly tilt the horn so that the fluid gradually runs into the pig's mouth, and as it is swallowed pour in more.

Never pour a large quantity into the mouth at one time, nor tie the loose end of the cord that is over the beam or through the ring, but let an assistant hold it, so that the patient's head can be depressed, which it is instantly necessary to do if the animal begins to cough or make a gurgling noise in the throat. Some pigs are very reluctant to swallow. Others, especially when the air passages are diseased, can only swallow with considerable difficulty, and it is these cases which require a lot of time and patience bestowed on them.

I should here mention that in the few cases where there is blockage of the nostrils through swelling, &c., causing difficult breathing, the head should be raised by placing a string underneath the bottom jaw, and not put in the mouth in the usual way.

THE DAIRY HERD.

QUEENSLAND AGRICULTURAL COLLEGE.

RETURNS FROM 1ST TO 31ST MARCH, 1900.

Name of Cow.	Breed.	Date of Calving.	Yield.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.			
Isabelle ...	Ayrshire	2 June, 1899	88	4·2	4·13	Dry, 10-3-00
Linnet ...	,, ...	19 June ,,	618	4·0	27·68	
Leesome* ...	,, ...	12 Oct. ,,	673	3·9	29·38	
Ream Routhie	,, ...	19 Sept. ,,	551	4·1	25·3	
Laverock* ...	,, ...	7 Dec. ,,	849	3·6	34·23	
Blink* ...	,, ...	21 Mar., 1900	274	4·1	12·58	
Effie* ...	Jersey	16 Dec., 1899	754	4·4	37·15	
Content ...	,, ...	11 July ,,	483	4·8	25·97	
Eileen* ...	,, ...	13 Aug. ,,	512	5·3	30·39	
Jersey Belle	,, ...	4 July ,,	77	5·1	4·39	Dry, 10-3-00
Stumpy ...	,, ...	1 July ,,	578	4·8	31·07	
Playful ...	,, ...	6 Aug. ,,	68	4·6	3·5	Dry, 8-3-00
Ivy ...	,, ...	2 Oct. ,,	373	5·2	21·72	
Opale ...	,, ...	16 Dec. ,,	698	4·6	36·06	
Beatrice ...	,, ...	19 Oct. ,,	435	4·8	23·38	
Bashful ...	,, ...	16 Nov. ,,	389	4·2	18·29	
Connie ...	,, ...	29 Sept. ,,	332	5·5	20·45	
Pet ...	Grade Jersey ...	6 Oct. ,,	344	3·4	13·09	
Scarlet ...	South Coast ...	13 Oct. ,,	687	4·1	31·54	
Misery ...	,, ...	4 May ,,	116	4·0	5·19	Dry, 15-3-00
Toughy ...	,, ...	11 Sept. ,,	489	3·8	20·81	
Plum ...	,, ...	3 Dec. ,,	433	3·3	16·0	
Fancy* ...	,, ...	21 Mar., 1900	163	4·0	7·3	
Banjo ...	Devon	5 Oct., 1899	367	4·4	18·08	
Broad ...	,, ...	5 Oct. ,,	551	4·3	26·53	
Rosie ...	,, ...	11 Oct. ,,	483	4·0	21·63	
Monday ...	,, ...	24 Oct. ,,	481	4·4	23·7	
Patience ...	,, ...	5 Oct. ,,	398	3·8	16·93	
Spot ...	Shorthorn ...	17 Oct. ,,	431	4·2	20·27	
Plover ...	,, ...	25 April ,,	19	3·8	·808	Dry, 3-3-00
Painter ...	,, ...	4 Sept. ,,	583	3·8	24·81	
Brush ...	,, ...	12 Sept. ,,	579	3·7	23·99	
Blossom ...	,, ...	14 Sept. ,,	411	3·6	16·57	
Florrie ...	,, ...	15 Sept. ,,	587	3·9	25·64	
Kit ...	,, ...	16 Sept. ,,	479	3·9	20·94	
Hilda ...	,, ...	25 Mar., 1900	77	3·8	3·28	
Folly ...	,, ...	12 Mar. ,,	320	4·1	14·7	
Polly ...	,, ...	29 Jan. ,,	633	3·4	21·1	
Cherry ...	,, ...	19 Feb. ,,	847	3·6	34·15	
Guinea ...	,, ...	20 Feb., ,,	816	3·5	31·98	
Frizzy ...	,, ...	27 Sept., 1899	548	3·9	23·93	
Kate ...	,, ...	30 Aug. ,,	436	4·0	19·53	
Violet ...	,, ...	1 Oct. ,,	616	3·8	26·21	
Laurel ...	Grade Shorthorn	4 Oct. ,,	671	3·9	29·3	
Restless ...	,, ,, ...	4 Oct. ,,	668	3·8	28·43	
Rosella ...	,, ,, ...	9 Oct. ,,	775	3·8	32·98	
Redmond ...	,, ,, ...	6 Oct. ,,	639	3·8	27·19	
Jane ...	,, ,, ...	13 Oct. ,,	421	4·1	19·33	
Shelly ...	,, ,, ...	13 Oct. ,,	478	4·1	21·94	
Peggy ...	,, ,, ...	14 Oct. ,,	416	4·0	18·63	
Stranger ...	,, ,, ...	15 Aug. ,,	597	3·9	26·07	
Empress ...	,, ,, ...	23 Aug. ,,	552	4·0	24·72	
Mundah ...	,, ,, ...	29 Sept. ,,	489	3·7	20·26	
Sally ...	,, ,, ...	23 Sept. ,,	698	4·0	31·27	
Whiteflank ...	,, ,, ...	4 June ,,	573	3·9	25·02	
Star ...	,, ,, ...	17 Dec., 1898	475	4·7	25·0	
Ginger ...	,, ,, ...	17 June, 1899	522	4·1	23·97	
Biddy ...	,, ,, ...	18 May ,,	481	4·0	21·54	
Bally ...	,, ,, ...	12 Oct. ,,	438	3·9	19·13	
Beauty ...	,, ,, ...	14 Oct. ,,	512	3·7	21·217	
Leopard ...	,, ,, ...	17 Oct. ,,	577	4·0	25·04	
Trial ...	,, ,, ...	26 Oct. ,,	665	3·9	29·04	
Duchess ...	,, ,, ...	27 Oct. ,,	580	3·6	23·38	
Podge ...	,, ,, ...	1 Nov. ,,	593	3·8	25·23	
Russet ...	,, ,, ...	10 Nov. ,,	535	4·0	23·96	
Rusty* ...	,, ,, ...	17 Jan., 1900	796	3·8	33·87	

Plate CXCIII.

THE PIGGERIES, QUEENSLAND AGRICULTURAL COLLEGE.

THE DAIRY HERD—*continued.*

RETURNS FROM 1ST TO 31ST MARCH, 1900—*continued.*

Name of Cow.	Breed.	Date of Calving.	Yield.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.			
Alice ...	Grade Shorthorn	13 Nov. 1899	687	4·0	30·77	
Daisy ...	,, ,, ...	21 Nov. ,,	588	3·6	23·7	
Nell ...	,, ,, ...	1 Dec. ,,	497	3·4	18·92	
Damsel ...	Holstein ...	5 Dec. ,,	557	3·1	19·33	
Dairymaid*	,, ...	15 Mar., 1900	472	3·2	16·91	

The Cows marked * are being used for experimental purposes. The rest of the herd were grazed on natural pasture during the month, and received, in addition, a small quantity of green sorghum each night.

WHAT BACON ENGLAND REQUIRES.

OVER-fat pigs are becoming alike unmarketable in Great Britain and America. The public taste is indicated by the report of a leading London firm engaged in the trade. One day with another, it is stated, the pig that commands the highest price is an animal which, though well finished, must not be over-fat, and which turns the scales dead weight at about 1 cwt. 2 qr. (12 stone). The live weight of this animal would be about 15½ to 16 stone. It is called a "sizeable" bacon pig, and is the type of hog required for the London longside singed bacon trade. Pigs weighing from 1 cwt. 2 qr. to 1 cwt. 3 qr. are known as "stout," while those scaling from 1 cwt. 3 qr. to 1 cwt. 3 qr. 14 lb. are known as "over-weight." These pigs are always quoted at 3s. to 4s. under top price, as the bacon manufactured from them is inferior, and has to be sold for considerably less than best quality bacon in the English markets. Pigs known in the trade as heavy over-weights scale over 15 stone, and are of little or no value for bacon, and if taken at all will be subject to a very considerable reduction in price. Sixes is a term applied to pigs under 1 cwt. 1 qr. which at some seasons, notably the spring, are quoted at 4s. to 5s. per cwt. less. At such times it pays the farmer to feed them for a few weeks longer.

QUEENSLAND AGRICULTURAL COLLEGE.

EXPERIMENTAL PIG-FEEDING.

BY JOHN MAHON, Principal.

THE experiments, of which particulars are forwarded herewith, were undertaken with the view of ascertaining the value of malting barley for pork production, and to compare the relative increase made by pigs under the conditions maintained during the period covered by the experiment.

Eight pigs which had been grown under similar conditions—*i.e.*, run in a grass paddock, and receiving a daily allowance of mangold—were divided into two lots of four each.

"A" pen were given as much boiled mangolds as they would consume, and a quantity of kitchen swill.

"B" pen were fed on ground barley and boiled mangolds.

The food was fed in the condition of a thick slop. Water was supplied to both "A" and "B" pens in addition to the food.

The pigs were from common-bred sows by a Berkshire boar, and were twenty-two weeks old at the time of starting the experiment.

The gain in weight made by pen "A" was, as anticipated, very small, amounting to ·6 lb. per day each, while the daily gain per head in pen "B" was 1·65 lb. It was found, in the case of "A" pen, that when an animal reached the weight of 100 lb. (live weight) the increase after that was very slight indeed; in fact, it seemed evident that the animals were growing, and not making flesh at all on the food supplied.

On perusing the increase tables, it will be noticed that pigs No. 3 in "A" and "B" pens gave the smallest return in their respective pens during the period, and it may be remarked that those animals were indifferently bred pigs, and were only included with a view of ascertaining if the better bred pigs would give a larger return for food consumed. A reference to the tables will show a difference in favour of the better bred pigs.

The value of barley at the time of the experiment was 2s. 6d. per bushel, so by feeding to pigs it gave a return equivalent to 3s. 4d. per bushel, or 1s. 5d. in favour of its use in pork production.

TABLE I.

SHOWING WEIGHT OF PIGS AT BEGINNING OF EXPERIMENT AND DAILY INCREASE OF EACH PIG, AND TOTAL INCREASE OF EACH.

PEN A.	Fed on Boiled Mangolds.				Total.	PEN A.	Fed on Ground Barley, Mangolds (boiled).				Totals.
	1.	2.	3.	4.			1.	2.	3.	4.	
	lb.	lb.	lb.	lb.	lb.		lb.	lb.	lb.	lb.	lb.
Weight at beginning of experiment	88	91	93	84	356	Weight at beginning of experiment	116	116	100·5	95·4	427
Gain—						Gain—					
23 February ...	4	·5	1·5	3	9 0	23 February ...	5	3 5	3·5	4	16
24 „ ...	3	...	1	1·5	5·5	24 „ ...	3	1·5	1·0	2	7·5
25 „ ...	...	1·5	·5	2·0	4·0	25 „ ...	2	1·5	1·5	1	6·0
26 „ ...	1	2·0	1	1·5	5·5	26 „ ...	3	2·5	1·0	1·5	8·0
27 „ ...	...	·5	...	1	1·5	27 „ ...	1	1·5	...	1·5	4·0
28 „ ...	2	1·5	...	1·5	5	28 „ ...	1·5	1·0	·5	...	3·0
1 March	...	...	...	1	1	1 March	3	2	3·5	3	11·5
2 „	2	1	1	...	4	2 „	2	3	3	3	11
3 „	2	2	1·5	1	6·5	3 „	4	2·5	3·0	1·5	11
4 „	...	...	·5	1	1·5	4 „	1	1	2	2	6
5 „	1	2	1	1	5	5 „	3	2·5	1·0	2	8·5
6 „	...	1	...	1	2	6 „	3	2	1·5	1·0	7·5
7 „	1	1	1	·5	3·5	7 „	1·0	1	·5	·5	3
8 „						8 „	1·0	2·0	1·5	1·0	5·5
9 „						9 „	1·5	2·5	1 0	1·5	6·5
10 „						10 „	·5	2·0	·5	1·5	4·5
11 „						11 „	1·5	1·0	1·5	1·0	5·0
12 „						12 „	2	1·5	1·5	1·5	6·5
1 „						13 „	2·5	2·0	·5	·5	5·5
14 „						14 „	1	1	1	1	4·0
15 „						15 „	2	2	1·5	3·5	9
16 „	...	1	·5	1	2·5	16 „	1	1	1	3 0	6
17 „	·5	·5	1·	1	3·0	17 „	1·5	1	1	3	6·5
18 „	1	·5	·5	·5	2 5	18 „	2	1·5	1·5	2 0	7·0
19 „	1	·5	...	...	1·5	19 „	1·5	1·0	1·0	2·5	6
20 „	1	·5	...	·5	2·0	20 „	1 0	1·5	·5	3·0	6
21 „	·5	...	...	1	1·5	21 „	1·0	1·5	1	1	4·5
Gain per head ...	20	16	11	20	67·0	Gain per head ...	52·5	47	37	49	185·5

TABLE II.

SHOWING WEIGHT OF EACH PIG AT BEGINNING OF EXPERIMENT, WEEKLY GAIN, AND TOTAL GAIN DURING PERIOD.

PEN A.	Fed on Mangolds (boiled) and Swill.				Totals.	PEN B.	Fed on Barley (ground) and Mangolds (boiled).				Totals.
	1.	2.	3.	4.			1.	2.	3.	4.	
	lb.	lb.	lb.	lb.	lb.		lb.	lb.	lb.	lb.	lb.
Weight at beginning of experiment	88	91	93	84	356	Weight at beginning of experiment	116	116	100·5	94·5	127
Gain—						Gain—					
1st week	10	6	4	10·5	30·5	1st week	15·5	11·5	7·5	10	44·5
2nd week... ...	6	7	5	5·5	23·5	2nd week ...	17·	14·	14 5	13·	58·5
3rd week.						3rd week... ...	10	12·	7·5	8·	37·5
4th week	4	3	2	4	13 0	4th week... ...	10	9·5	7·5	18·	45·0
Weight at end of experiment	108	107	104	104	423	Weight at end of experiment	168·5	164	137·5	143·5	612·5
Gain at end 4th week	20	16	11	20	67 0	Gain at end 4th week	52·5	47	37·	49	185 5
Average daily gain by each	..	...	...	...	·6	Average daily gain by each	...	...	...	...	1·65

Plate CXCIV.

Fig. 1.

Fig. 2.

Fig. 3.

PEDIGREE BERKSHIRE PIGS, QUEENSLAND AGRICULTURAL COLLEGE.

TABLE III.

Showing Amount of Food Consumed Weekly by Each Pen, Total Food Consumed during the Period by Each Pen, and Average Daily Consumption per Pig.

Pen A.		Pen B.		
	Mangolds (boiled).		Barley (ground).	Mangolds (boiled).
	lb.		lb.	lb.
1st week ...	570	1st week ...	44	408
2nd week ...	481	2nd week ...	94	130
3rd week ...	423	3rd week ...	116	105
4th week ...	414	4th week ...	136	38
	1,888		390	681
Average daily consumption by each ...	17·0	Average daily consumption by each ...	Barley 3·48	6·08
			9·56 lb.	

Average Daily Feed per Pig.	Average Daily Feed per Pig.		Number lb. Food Consumed for 1 lb. Increase.	Number lb. Food Consumed for 1 lb. Increase.
Pen A.	Pen B.		Pen A.	Pen B.
Mangolds (boiled).	Barley (ground).	Mangolds (boiled).	Mangolds (boiled).	Barley and Mangolds.
lb.	lb.	lb.	lb.	lb.
17·0	3·48	6·08	28·1	5·77
	9·56			

RELATIVE VALUES OF FODDER AND PRODUCT.

				s.	d.
Pen A.—*Food Consumed*—					
1,888 lb. mangolds, at 10s. per ton	...	...	...	8	5
Increase of pork, 67 lb., at 2¼d.	...	...	...	12	6¾
Pen B.—*Food Consumed*—					
390 lb. barley, at 2s. 6d. per ton	...	...	...	19	6
681 lb. mangolds, at 10s. per ton	...	...	...	3	0

Increase of pork, 185·5 lb. at 2¼d. live weight, £1 14s. 9¾d.; 3s. worth mangold produced 4s. 6d. worth of pork, and the total amount of pork produced was 185·5 lb. valued at 2¼d., £1 14s. 9¾d; £1 14s. 9¾d. — 4s. 6d. gives £1 10s. 3¾d. as the value of the pork actually produced by 7·8 bushels or 19s. 6d. worth of barley. Therefore the gain by feeding barley to pigs = 1s. 5d. nearly per bushel when barley is of a value of 2s. 6d. per bushel, and the feeding value of barley for pork production is 3s. 11d. per bushel when pork is worth 2¼d. per lb. live weight.

(*Vide* Plate CXCIV.)

No. 1

BERKSHIRE SOW.

Farrowed 1st February, 1898.

Sire—Stanley, by Royal Master, by Maori Chief.

Dam—Countess 1st, by Jack.

g d Jubilee, by King Tom.

g g d Tilly (imported).

No. 2

BERKSHIRE SOW.

Sire—Trafford's Herom, by Sir Humphrey de Trafford (imported).
Sir Humphrey de Trafford by Lord Windsor.
Dam—Belle Belton 3rd, by Maori Chief.
g d Belle Belton, by Windsor Boy (imported).
g g d Jubilee, by King Tom.
g g g d Lady Champion 1st, by Prince Charlie.

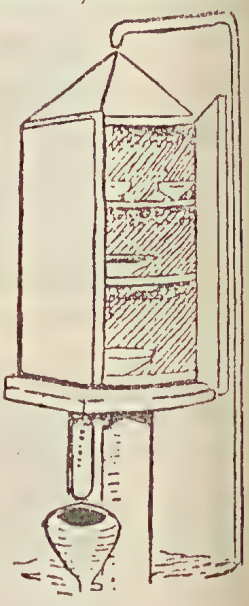
No. 3

BERKSHIRE SOW.

Sire—Jack, by Young Sultan, by Sultan.
Dam—Rosebud, by Abel, dam Tempest.
g d Lady Alice, by Lord Salisbury.
g g d Lady Blanche, by Berkeley Duke.

A SIMPLE BUTTER-COOLER.

THE illustration herewith depicts a very ingenious butter-cooler, which is the invention of Mr. B. Seppelt, of Seppletields Court, South Australia. It is thus described in the *Melbourne Weekly Times* :—



On a post about 4 feet in height a platform is made about 2 feet square, with a galvanised iron trough or gutter round the edge. On this platform a wooden frame is constructed, having an angle roof, and one side fitted so as to form a door. Canvas is stretched over the whole of the framework, and a pipe from the water supply is led up and bent over the top. The water from the pipe is allowed to drip on to the canvas just fast enough to keep the covering damp, the surplus being caught in the gutter below. The result is a cool, flyproof safe, in which, during the hottest weather, butter can be kept firm and in good condition. If a water supply from a stand pipe is not available, just as good results can be obtained from a kerosene tin filled with water and placed on the post above the safe. A small hole in the bottom of the tin partially plugged with rag will admit of a trickle of water escaping, but care must be taken to maintain a regular supply in the tin.

STRAINING MILK THROUGH SAND.

AT a dairy in Berlin, famous for the purity of its milk, the milk is strained through a wire sieve with a cloth, on which rests a deep layer of fine sand. Before the sieve is again used, the sand is put in a hot oven to destroy any possible germs.

Poultry.

INDIAN RUNNER DUCKS.

Since publishing (in our March number) the experiences of Mr. D. F. Laurie with his Indian runner ducks, we have heard further of Mr. S. H. Pittman's success with this breed. He says: "The pen of runner ducks are now in full moult, consequently I have to report a small laying for the twenty-second month, fourteen eggs, making a total of 3,485." It is interesting to note that they moulted at the same time last year, and then laid sixteen eggs during the period—*i.e.*, from 20th February to 20th March. They have come out of moult splendidly, and look well. Mr. Pittman has a flock of which nine ducks laid an average of 210 eggs each for the year; these ducks, he considers, are a little goldmine for eggs alone. They are not a large breed, averaging only about 4 lb. each (about the weight of the common duck); but they possess the advantage of maturing early and laying at an earlier age than other breeds. They make excellent crosses with Pekins and Aylesburys, and produce good table birds. Another advantage is that they improve the laying power of the crossbreds.

THE POULTRY INDUSTRY IN 1899.

It is interesting to learn the average prices of eggs from each of the following countries as an indication of their respective values:—

Averages, 1899.

	s.	d.	
Russia	5	5¾	per 120
Denmark	6	0¾	,,
Germany	5	7	,,
Belgium	6	2	,,
France	7	7	,,
Canada	7	2¾	,,
Other countries	6	0¾	,,

The figures for poultry and game are:—

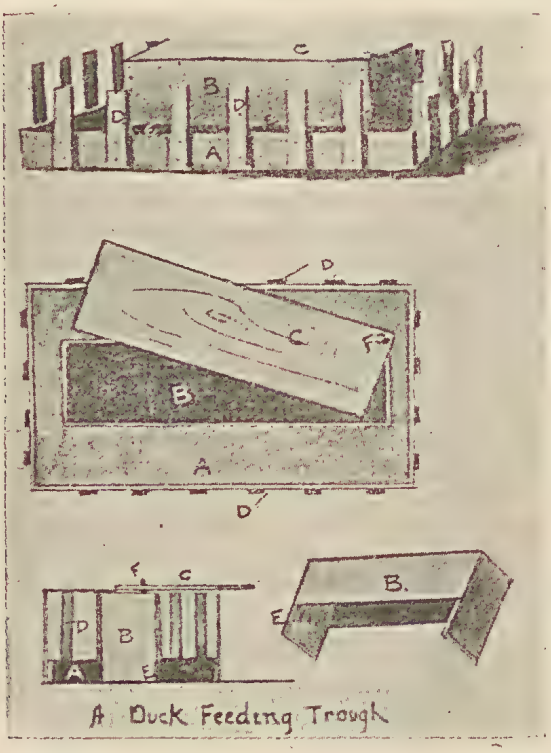
	1897. £	1898. £	1899 £
Russia	185,925	164,598	139,834
Belgium	164,179	127,923	165,803
France	326,113	217,703	296,555
Other countries	123,608	127,368	183,102
	£730,725	£637,492	£785,294

Here we find that the only country showing a falling-off is Russia, due to the mild winter and the great risk of sending birds such long distances, except when properly frozen and in time of low temperature. Belgium, France, and other countries give a considerable increase. It is an interesting fact that of

the imports of poultry and game in 1899 no less than £296,337, or nearly 38 per cent. of the total for the year, arrived in the month of December. In that month the respective proportions of the year's imports from each of the named countries were :—Russian, not quite 5 per cent.; Belgium, 52 per cent.; France, 46 per cent.; and other countries, 35 per cent.

The year just ended has been remarkable for the deficiency of home eggs in the closing months. To some extent a similar state of things existed in 1898, but not nearly to the same degree. In many cases pullets hatched last March are only now coming into profit, at least three months later than might have been expected. As a consequence eggs have been very scarce and dear, and 16s. to 18s. 6d. per 120 for really fresh eggs have been the ruling wholesale prices. Those who had a good supply must have reaped a golden harvest.—*Rural World.*

A DUCK FEEDING-TROUGH.



THE above excellent idea emanates from a correspondent of *Garden and Field*, who has it in practical use. The arrangement is very simple, and appears to meet the wants of breeders of ducks. As a general rule food is thrown into the yard to the ducks, and in a few minutes it is a dirty sloppy mess, and not fit even for pigs to eat. The above is made from two boxes, any size, and any kind to suit convenience, preferably a shallow one for the bottom A, and a deep one B to place the food in. B is nailed to A at the bottom two ends ; the lower part of the sides being cut away, as shown at E. The top of B also is open ; a lid C is put on to this—just a screw in the corner F ; this acts as a pivot. Laths D are nailed at intervals round the shallow box to prevent poultry getting in. The food is placed (soft) into B, and the lid closed over it. The food will then fill the tray automatically.

The Orchard.

THE CULTIVATION AND USES OF THE ROSELLA.

By DANIEL JONES,
Department of Agriculture.

The Rosella (*Hibiscus Sabdariffa*) is one of our most valuable fruits, and, from the standpoint of the thrifty housekeeper, few edibles in the range of domestic cookery lend themselves more usefully to the stocking of a housewife's cupboard. In dealing with this fruit, I shall, as briefly as possible, refer to the cultivation of the plant as well as indicate a few methods of preparing the fruit for domestic needs.

SEED.

The most important matter to attend to, in the first instance, is to procure sound, fertile seed. Seed grown in the Northern part of the colony is usually safer to use than that grown in our Southern districts, it being on the whole better developed and more likely to be fertile. The Northern growers having a longer maturing season, owing to the absence of frost, a fuller germination and hence a better quality of seed is produced by them. Nevertheless, in certain seasons in our Moreton districts, it is possible to save seed fully equal to that grown in more tropical parts, as I have experienced; yet it is by no means certain that the season may prove propitious, and the local seed may turn out barren, although, to the inexperienced eye, it may appear otherwise.

SOIL.

Any moderately good soil will grow rosellas well. Land with a clay subsoil, if the latter be near the surface, had better be avoided if cultivating on a large scale; but for an allotment garden, where only a few trees are grown, the plant, with an average amount of attention, can be cultivated well enough to give returns sufficient to fill the cupboard for family needs, though perhaps not on so lavish a scale as if grown under more favourable conditions.

The shrub being hardy and, as a rule, fairly ornamental, given fair treatment, is calculated to adorn and prove useful in the kitchen garden no less than in the field.

SOWING.

My practice was to fix upon small patches of clean soil for a seed bed contiguous to the area proposed to be set out. For instance, when planting several acres, I found, by my method of setting, I could treat a much larger area with less labour, and do it more efficiently, by drawing from the nearest seed beds as the transplanting proceeded. For the ordinary kitchen garden it will suffice to mark out a plot a few feet square and lightly cover the seeds, well watering them and keeping the plot free of weeds until the plants are about 6 inches high, and then set them out in rows about 6 feet apart. If the grower is not disposed to start his seed from beds, the latter can be sown where the bushes are to remain, and thus the trouble of transplanting is saved; but precaution must be taken to have a few spare plants to meet the contingency of having some destroyed by grubs or other causes, so that the vacant spaces can be filled up. The best time to establish seed beds is during the month of October. Early sowing is recommended in the Southern parts of the colony, as, in the event of early frosts coming on, the maturing of the fruit will be seriously affected.

I have observed that late plantings in November generally prove fruitful, but, owing to the shortened period for attaining maturity, the plants will only be imperfectly grown, and produce but a proportionately limited crop. Hence, to obtain the most satisfactory results, early propagation of the plant is imperative. Of course, in our Northern regions and in part of our Southern coastal districts, which are comparatively immune from early frosts, the planting season can be safely put off until November or the early part of December without undue risk to the crop.

TRANSPLANTING.

In the ordinary course of garden work, the transplanting is usually performed by the simple removal of the plants from the seed bed, without unduly tearing the tender root. A small hand fork for loosening the soil, so that the plant can be lifted in good order, is all that is needful. The plants having been raised, set the plants out in regular rows, and in well-firmed fertile soil, giving due heed to the equal extension of the root fibres, which not only helps to hold the plant firm as against strong winds which often seriously affect the shrub when in vigorous growth, as it acquires a head considerably out of proportion to its foothold, but it also enables the roots by the regular radiation to find more plant food for the sustenance and early development of the bush—all of which, though apparently trivial precautions, nevertheless have a very important bearing on the cultivation of this fruit. Perhaps my own practice in handling this crop as a feature of field and orchard operations may now be brought in. During my early orchard efforts, while my young trees were being planted out, it became necessary to discover what catch crop could be cultivated with advantage between the rows of orchard trees. My choice, for some seasons, fell on the rosella as being a crop which would not unduly interfere either with the cultivation of my fruit trees or exhaust the soil to any serious extent. The first lesson in orchard operations, more especially with young trees, is to have and keep your land clean from weeds at the least possible cost, which at once suggests the employment of labour-saving machinery. I determined to try a system of my own devising, which proved very successful.

As my planting operations necessarily spread over several acres of orchard, and at most two rows of plants could be set in between each row of fruit trees, in order to facilitate transplanting over this area, I, as before stated, selected suitable spaces contiguous to my proposed planting areas for seed beds, sowing the seed not so thickly as ordinary for reasons hereafter given. These beds were well watered and kept clean, so that in the transfer of plants no weeds would be conveyed to the orchard land. Most persons acquainted with the routine of orchard work will appreciate the necessity for keeping the land clean to the very last possible moment by the aid of horse implements. Immediately after running the harrows or scarifier over the land and as soon as the soil was in a satisfactory condition, I pegged out my line of drills between the rows of fruit trees, and with an American post-hole digger, with one drive of the implement, raised the necessary amount of soil to enable the transplanted plant to occupy the space, and thus rapidly traversed my length of drill. My next operation was to pick up the plant and soil with the digger from the nearest seed bed, and transfer plant and soil into the hole prepared for it.

The opening and closing mechanism of the digger lends itself most perfectly to this work, and a pressure of the foot on each side of the plant is all that is needed to permanently fix it in its place. Thus the plant is set with the soil at its root undisturbed, and it continues to grow without check. This system I have successfully adopted in transplanting melons and other plants of a delicate nature that usually do not thrive under harsher treatment. For filling up misses in the rows I have found with many crops this instrument quite as valuable as in its legitimate use as a post-hole digger. But an implement that will satisfactorily perform in some soils may prove a comparative failure in others, hence I do not claim that in all soils success will necessarily follow. I am quite aware that the waxy black soils or heavy clays are not best adapted for my system, but on such soils as I then worked—red loam of a sandy nature

For any of our light scrub soils I know of no better system to adopt. The propagation of this plant by cuttings is not commonly adopted, and indeed is not as satisfactory as from seedling plants; still there are times when the system will prove worthy of a trial. It may be that from failure of the seed to germinate there are not enough plants to fill the area or to supply misses in the rows transplanted. As it is, however, imperative to replace them, propagation from cuttings, or, more properly, branches, will be expedient. When the shrubs are 1 foot or 18 inches high, select from your most vigorous and bushy shrub a couple of the lower branches. Do not cut them, but, with a gentle snatch, break off the wood close to the main stem of the shrub. It will break off very easily, and on examination of the branch you will observe the edging of the break will indicate a strong rim of bark which will, on transplanting, quickly become callous and soon provide a good root-hold for the shrub. Bushes propagated in this way in some seasons bear when the more vigorous and earlier shrubs carry little or no fruit, but they are invariably more stunted in growth, yet usually yield a fair crop. Thus, by adopting any of the systems here described, the prospective grower can hardly fail. With a moderate rainfall, rosellas will grow luxuriantly in any locality where the soil is suitable, and when winter frosts do not set in too early to allow of the proper maturing of fruit. Too exposed situations should, if possible, be avoided, as high winds, blowing on the bush with its luxuriant foliage, often break down the branches, and, in times of continued wet weather, blow the shrubs over.

PICKING THE FRUIT.

This is a rather monotonous occupation for adults, and is more suitable for the young folks. As soon as the fruit is matured, it is advisable to lose no time in gathering. When this work is delayed, I have observed a tendency on the part of the fruit stalk to so toughen as to be an impediment to quick gathering, and, moreover, it leaves the fruit exposed after maturity on the shrubs to become to some extent deteriorated by the attacks of aphis, which often affect it at this stage. In picking for market, care should be observed to pick the fruit as free as possible from stalks, leaves, &c., as, when required by jam factories, the presence of such superfluous matter will militate against its sale.

SHELLING.

The removal of the edible covering from the seed pod is a somewhat wearisome business, more especially when it depends on hand labour. Usually, the pod is taken in the hand and the covering is dragged off piecemeal, and a knife is employed to sever the base of the pod, which facilitates the removal of the covering, both of which operations are rather slow. Here comes in the truth of the old adage that "necessity is the mother of invention," and, as a result, an invention is to be obtained from some of our city seedsmen that overcomes the difficulty of separating the pods from the fruit, and, the cost of the instrument being moderate, any grower on a large scale who requires to separate the fruit will do well to purchase one. The diagram shows two forms

Fig. 1.

of the instrument. Fig. 1 was invented and patented by Mr. T. Chalk, of Coorparoo; and Fig. 2 is an improvement on it, which I made for my own use.

Fig. 2.

The difference in the two instruments is that the piston in mine is moveable and is supplied with a spring, and, that being so short, it can be worked with one hand whilst the fruit is held in the other. Those who care to construct the apparatus for themselves can easily do so with little trouble or cost. My appliance was home-made, and, although crude in appearance, answered its purpose very well. To describe the article, simple though it be, is not very easy; but the outlines being given, the ingenious grower will perhaps be able to, by help of the illustration here given, seize upon the design. It can be made by taking a common cotton-reel and whittling down one end to receive a ferrule, for which I used a small brass cartridge-case. This fits on the end of the reel and acts as a cutter, which is worked by taking the pod in one hand and pressing the ferrule into the stalk-end of the pod and giving it at the same time a slight turn, which causes the cutter to pass clean through the covering, and so relieves the pod. To expel the latter from its covering, you make a small pusher from a piece of round wood that will just work through the hole in the centre of the reel. This piece of wood is made with a flat head, so that it rests against the palm of the hand without hurting it when pressing the pad out, while between the top of the pusher and the reel-head is put a small spiral spring made out of any light wire. This is put on to draw back the pusher after it has driven out the pod, and thus you can quickly and easily prepare this fruit for use.

UTILISING THE FRUIT.

Most housewives are familiar with the various uses of the rosella. For jam-making it is well adapted, making a palatable, easily-kept product, if put up in earthenware or glass. Unfortunately, rosellas contain an acid principle which precludes putting up this class of fruit in ordinary tinware, and hence some failures have been experienced in this respect. For pickles the fruit is well adapted, and it makes an excellent condiment. In my own experience, I have found that the best method of handling the fruit was to dry it after removing the pod from the capsule, which, if done with the instrument before described, cuts out the covering nearly whole, which is thus better adapted for drying purposes. I have kept the dried fruit in jars and tins for two or three years in good order. Rosella-growers would do well to give this mode of preparing the fruit more attention, for I have found it far and away the best in saving the crop. All that is necessary to do in drying is to prepare the fruit as I have shown, and, in some roomy, airy position (not necessarily in the sun), place the fruit either on trays or sheets on the floor, allowing as much air to pass through and over the fruit as possible. In a few days all superfluous moisture will have evaporated, and the dried article can be packed away in jars. By this means rosellas can be had in good condition all the year round. All that is needful, when required for use for jam, tarts, &c., is to take the quantity necessary and pour over the fruit a little water, when it will absorb the water and resolve itself into apparently fresh fruit. The large grower has in this method a certain way of keeping such surplus fruit that may not be in immediate demand, or that the low prices ruling may deter him from marketing as ordinary fruit. I am of opinion that fruit put up in this form, and exported to the London market, should give better results than the already proved failures in the form of jams.

It is not commonly known that in the utilisation of the choko, now fast becoming a popular vegetable, that very pleasant tarts can be made by using that vegetable (*Sechium edule*) in conjunction with the rosella. It is well known that many object to what they term the excessive tartness of the rosella. Using it in conjunction with the choko this tartness is modified, and tends to make both these fruits more appetising. In fact, rosellas are specially adapted for blending with less tart fruit, as they give a flavour to many fruits and vegetables which otherwise would not be so acceptable for table use.

WINE-MAKING.

This is a further use for rosellas. Although I have no personal experience in this method of dealing with the fruit, I know that a good palatable beverage is made from rosellas. To those who care to try to utilise this fruit in this manner, I give here a recipe sent me by a friend who has a wide reputation as a maker of rosella wine:—

ROSELLA WINE.

Put your fruit into a cask that has one head out. Pour boiling water over the fruit, rather more than enough to cover it. Let this stand for about three days—stir now and again.

At the end of three days, strain the liquor into another cask—*this cask to have both heads in.* Then for every gallon of liquor take 3 lb. of sugar, and make a good thick syrup of same.

Pour this syrup while hot into the liquor, and stir well.

Leave the cask with the bung out until fermentation starts. Should this not occur, say, in twenty-four hours, add a bottle of yeast. Keep the cask in as even a temperature as possible, as this will help the fermentation.

In the process of fermentation, you will lose some of your liquor. Should it ferment thoroughly, save the liquor that overflows from the bung-hole, and put it back into the cask; but should you find this not enough to keep your cask full, add a little warm water.

When the liquor has almost finished fermenting—say when it stands at 3 degrees density by the saccharometer (Beaumè)—bung up the cask and leave for three months. Then bottle.

From *Hibiscus Sabdariffa*, fibre has been repeatedly made, specimens of which and of cloth manufactured from it are to be seen in the museum of the Agricultural Department, William street. Some few years ago, a local grower gave the matter of the production of this plant considerable attention, specially in view of the utilisation of his crop for fibre purposes. I am of opinion that his failure to go on with the matter was consequent on want of machinery to prepare the fibre, which is a drawback only too patent with regard to the development of many industries of this character in Queensland.

DISEASES.

The diseases affecting this plant are not usually very formidable, although in certain seasons a grub attacks the roots of the bushes, and a disease, apparently fungoid in character, sometimes affects the shrub. The common aphis is usually present in quantity on matured fruit; but, on the whole, while this crop is, in common with others, susceptible to occasional serious injury from pests, it is hardy, useful for many purposes, and profitable to grow.

FRUIT CULTURE IN QUEENSLAND.

By ALBERT H. BENSON.

CITRUS CULTURE.—Part I.

In the various articles on Fruit Culture that have already appeared from time to time in this *Journal* I have directed my writing to what may be termed the cultural or primary branches of the industry, as, with the exception of a short paper on the Chickasaw Plum, I have dealt with the industry as a whole, and have not particularised the culture of individual fruits. I have endeavoured to show what land is suitable for fruit culture, and how it should be prepared, and have also given information respecting the various methods of propagating fruit trees; the laying out, planting, pruning, cultivation, and manuring of the orchard, as well as the best methods of keeping fruit pests in check.

I now come to the second part of my work, which deals with the particular cultivation of individual varieties of fruits, and I propose commencing with those fruits which are best adapted to our climatic conditions, and are also of the greatest value commercially.

A considerable portion of what I have already written respecting fruit culture in general is applicable to all kinds of fruit, so that it would only be an unnecessary repetition to go over the same ground with each particular fruit; but at the same time there are special methods of cultivation, pruning, &c., that are particularly adapted to individual fruits, which will be mentioned when dealing with them in detail.

THE ADAPTABILITY OF QUEENSLAND FOR THE CULTURE OF CITRUS FRUITS.

No fruits are more generally distributed or have a wider range in this colony than those of the Citrus family, as, with the exception of the colder parts of the Downs, where the winter temperature is too low; the Gulf country; and the dry Western districts, where there is no water available for irrigation, they can be grown from one end of the colony to the other, provided that they are planted in suitable soil, and that in the drier parts there is an available supply of suitable water with which to irrigate them during the prevalence of long dry spells. The country adjoining the eastern seaboard, extending from the Tweed River in the South to Cooktown in the North—a distance of about 1,100 miles and extending inland for nearly 100 miles—is naturally suited to the growth of citrus fruits, and there is probably no country in the world that is better adapted to or that can produce the various varieties of these fruits to greater perfection or with less trouble than this portion of Queensland. Of course, the whole of this large area is not adapted for citrus culture, as it contains many different kinds of soils, several of which are not suitable for the growth of these fruits, and there is also a large extent of country which is too broken and otherwise unsuitable. At the same time there are hundreds of thousands of acres of land in this area in which the soil and natural conditions are eminently suited to the growth of citrus fruit, and in which the tenderest varieties of these fruits may be grown to perfection without the slightest chance of their being injured by frost; and where the natural rainfall is such that, provided the trees receive ordinary care and cultivation, there is no necessity for artificial irrigation. At the present time there are hundreds of citrus trees growing practically wild in different parts of the coastal country that are in vigorous health and producing heavy crops of good fruit, even though they are uncultivated, unpruned, unmanured, and have to hold their own against a vigorous growth of native and introduced shrubs, trees, and weeds. When the orange, lime, citron, or common lemon become established under conditions that are favourable for their proper development, they apparently become as hardy as the indigenous plants, and are able to hold their own against them, thus showing how well the climate and suitable soils of coastal Queensland are adapted for the cultivation of citrus fruits. The commercial cultivation of citrus fruits is at present practically confined to this coastal area, the most important centres starting from the South being Nerang, Coomera, Redland Bay, Brisbane, Enoggera, Gatton, Toowoomba, North Coast line from North Pine to Gympie, including the Blackall Range and Buderim Mountain; the Wide Bay district, including Maryborough, Tiaro, Mount Bauple, Gayndah, Pialba, and Burrum; the Burnett district, including Bundaberg and Mullett Creek; the Fitzroy district, including Rockhampton and Yeppoon; Bowen, Tully River, Cairns and district, and Cooktown. In addition to these districts a few citrus fruits are grown at Mackay, Townsville, Port Douglas, and several other places. Citrus fruits are also grown further inland, but their cultivation here is largely dependent on the ability to supply the trees with suitable water for irrigation during dry spells. Frosts have also to be taken into consideration, for, though the days are warm, the temperature often falls considerably during the night, owing to

the great radiation; and citrus trees at districts like Roma, Emerald, &c., are liable to injury thereby. The soil in many of the inland districts is well suited to the culture of citrus fruits, and when the trees are given the necessary water and are uninjured by frost they produce excellent fruit, lemons especially being superior to those raised on the coast. I stated some short distance back that there is probably no country in the world that is better adapted to the cultivation of or that can produce the various kinds of citrus fruits to greater perfection or with less trouble than the eastern seaboard of Queensland. To many of my readers this may seem to be a very broad statement; but I am certain that, if suitable trees are planted in the right soil and under favourable conditions, and are given anything like the same care and attention that is devoted to the culture of citrus fruits in the great producing centres for these fruits in other parts of the world, we have nothing to fear either as regards the cost of production or the quality of the fruit produced. In order to exemplify this, it may be interesting to compare our capabilities with that of the principal citrus-producing districts north of the Equator. To begin with, I will take Florida, which more nearly approaches our climatic conditions than any other citrus-growing country that I know of, and which is noted for the excellence of its citrus fruit; and we find that we have all its advantages, except that of proximity to the world's markets, without its disadvantages. We have a better and richer soil, requiring far less expensive artificial fertilisers to maintain its fertility and at a very much lower price. We can grow equally as good fruit; in fact, it is questionable if Florida ever produced a citrus fruit equal in quality to the Beauty of Glen Retreat Mandarin, a Queensland production. We get as heavy if not heavier crops, and our trees come into bearing very early, and we have no freeze-outs similar to those which have crippled the industry in Florida so severely in the past that many of their wealthy growers are actually covering in whole orchards of as much as 15 acres in extent as a protection from frost. This covering-in is accomplished by means of a framework of timber having slat work or panel sides and tops—in fact, by enclosing their orchards in a huge elaborate bushhouse which is further protected by the heat produced by six large heating stoves or salamanders to each acre of trees enclosed. If it pays the Florida growers to go to all this expense in order to prevent freeze-outs and to produce first-class fruit, surely we can compete with them when a seed stuck in the right soil under favourable conditions will produce a strong, vigorous, healthy tree bearing good crops without any attention whatever.

In comparing Queensland with the citrus-producing districts of Southern Europe, we have the advantage of better and cheaper land, absence of frost, more vigorous growth, earlier maturity of the trees, and superior fruit; but with the advantage of cheaper and more skilful labour, especially in the handling and marketing of the fruit, and proximity to the world's markets in their favour.

As compared with California, our soil is no better than theirs, but it costs much less, and their citrus industry is dependent on artificial irrigation, their natural rainfall being altogether inadequate for the growth of citrus fruits. Californian conditions more nearly approach those of our inland districts, such as Barcaldine, with the exception that the only rainfall in California is during the winter, whereas in Barcaldine and similar districts the heaviest fall is during the summer months, but in both the successful culture of these fruits depends on irrigation.

In Jaffa, also, where the oranges are of large size and extra quality, the trees have to be carefully irrigated and manured, as these operations are found to be essential to the production of marketable fruit.

These few instances show how favourably the conditions prevailing in Queensland compare with those of the great citrus-growing districts of Europe and America, especially in the matter of soil and climate, and I feel confident that if the industry was taken up in the same business-like manner that it has been done in California and Florida that we could easily hold our own against

any part of the world. In comparing Queensland with the rest of the world we have the advantage, also shared by New South Wales and South Africa, of ripening our fruit at a time of the year that is the off season in the citrus-producing countries in the north of the Equator, so that our fruit does not clash with theirs; their ripening period and ours being at different times of the year. As regards our Australian market, our fruit ripening earlier than that of the Southern colonies, we are enabled to dispose of a considerable portion of our crop in the Southern markets before the local fruit is ready for gathering. This gives us three markets—First, a local one; secondly, a Southern one; and finally, when this demand is supplied, an oversea market to Europe, America, and possibly the East.

When grown under favourable conditions, citrus trees are heavy bearers in this colony, it being no uncommon thing to meet with seedling or worked orange trees of from fifteen to eighteen years of age, producing over twenty cases of marketable fruit to the tree, averaging about twelve dozen medium-sized fruit to the case; and I know of an Emperor Mandarin tree, a seedling, about twenty-five years old, that produced over thirty-seven cases of marketable fruit in one season. Worked trees come into bearing very early, and last season I saw trees only four years from the bud that produced as high as three cases of fruit to the tree, and one grower informed me that the crop from a number of trees of this age had averaged 18s. per tree; grown without water and without manure on land that had previously been under crop in bananas. These figures show that the orange and mandarin are heavy bearers when grown under favourable conditions in Queensland; but at the same time it is hardly fair to quote them as average returns, although I know of several places that have produced quite as good results as those quoted. I think that these figures tend to prove that this colony ranks very high already as a producer of citrus fruit, and that there is every reason to believe that it will take the premier position in this branch of fruit culture of any country south of the Equator.

Native Varieties of Citrus Fruits.

If any further evidence were needed to prove the adaptability of Queensland for the culture of citrus fruits, the presence of indigenous varieties in our coastal scrubs should be ample proof. There are three varieties indigenous to the colony, of which *Citrus australis*, the native orange or lime, is both the largest and most common. This variety grows into quite a large tree, having a diameter of trunk of from 15 to 18 inches and 60 feet or more in height. It produces a quantity of a thick-skinned acid fruit of from 2 to 3 inches in diameter, but of no commercial value. It would probably do as a stock for imported varieties, though as the young seedlings are such slow growers, and seedling oranges and mandarins are so easily raised, it has not been tested for this purpose to any extent.

Citrus australasica, the so-called finger lime, is a thorny bush producing a fruit about ¾ to 1 inch in diameter and 3 or 4 inches long, having a thin skin and an agreeable acid pulp, which is of a reddish colour in some specimens.

In addition to these two varieties which are met with in the Southern part of the colony, Mr. F. M. Bailey, the Colonial Botanist, has described a third, which he has named *Citrus inodora*, the North Queensland lime, which is met with in the scrubs of the Russell River. Mr. Bailey describes it as bearing a greater resemblance to the cultivated species than the two former varieties. It produces a fruit over 2 inches long by 1¼ inches in diameter, having a thin rind and juicy pulp of a sharply acid flavour, so that even in its wild state it is a desirable fruit and takes the place of the cultivated lemon. Mr. Bailey speaks highly of this fruit, and considers that it is worthy of propagation with a view to improvement, as, being indigenous to the Northern part of the colony, it is possible that it would eventually become a valuable addition to our cultivated citrus fruits.

Soils Suitable for the Cultivation of Citrus Fruits.

The selection of the soil is of vital importance, as the commercial success of the orchard mainly depends on the trees being planted in the right soil. It is impossible for me to emphasise this matter too strongly, as the failures in citrus culture in the past have been largely due to the trees having been planted in the wrong soil. No matter how well you look after your orchard, if it is planted in unsuitable soil your trees will never thrive, but will always be predisposed to diseases both of fungus and insect origin, and only produce a small quantity of inferior fruit. The undertaking will eventually end in disappointment and loss, and will result in the production of one more abandoned orchard to breed scales and other pests to the detriment of the industry generally. Thousands of citrus trees have been planted in unsuitable soil in many parts of the colony for many years past, and these trees, besides being a loss to their owners directly and the colony indirectly, are now a menace to citrus culture generally, as they form the best of all nurseries for the propagation of every kind of disease that attacks citrus fruits or citrus trees.

I strongly advise everyone who purposes planting a citrus orchard to give this matter the most careful consideration, and that, unless he is satisfied that his soil possesses the essential qualifications as presently described, it is better for him to give up all thoughts of citrus culture on such land, and to utilise it for a more suitable crop; or if he still wishes to go in for citrus culture, then to select some other land having the essential qualifications. If there is any uncertainty in the matter, then it will be better to communicate with the Department of Agriculture, so as to prevent any mistake, as the planting of a citrus orchard on the wrong soil is a loss to the colony. The first and all-important consideration in the selection of a soil suitable for citrus culture is that it possesses perfect natural drainage, so that, no matter how heavy or continued a rain we may have, there is no stagnant water in the soil, as stagnant water is a sure death to profitable citrus culture.

Such a soil may be either a deep sandy loam of granitic, sandstone, or alluvial origin, having a free porous subsoil; a friable sandy loam with a gravelly or shaly subsoil; or a friable volcanic loam, having no clayey subsoil. Probably the best all-round citrus soil is a deep, sandy loam of a reddish, brownish, or chocolate colour that is fairly rich in humus or organic matter, but not necessarily very rich in plant food, as the right mechanical condition of the soil is of much greater importance than extreme fertility. Such a soil is friable, easily worked, scours well, and retains moisture well, so that when kept in a good state of cultivation trees root deeply in it, and are not affected to any extent by slight droughts. The subsoil is of equal if not greater importance than the soil itself. It should be thoroughly friable, of a red or brownish colour, never yellow, blue, or greyish white—free from clay, and so porous that water runs through it rapidly. If the subsoil is of a yellow, blue, or greyish-white colour, it is a sign the land is sour and is impregnated with unoxidised salts of iron which are detrimental to the growth of citrus trees. Such a subsoil requires draining and aerating before it is suitable, even though it contains only a small proportion of clayey matter.

As previously stated, it is not as essential that the soil shall be rich in all plant foods as that it shall be in the right condition mechanically; at the same time, provided that the soil and subsoil possess the essential qualifications of friability and perfect drainage, it is no drawback but rather an advantage for it to be moderately rich as well, as in such a soil the trees will make a more rapid and vigorous growth than they would in a poorer soil, and will not need any systematic manuring for years to come. It is not an advantage to select too rich land, such as some of our rich alluvial or virgin scrub soils, as under these conditions the trees are apt to produce an excessive wood growth rather than fruit, and not come into bearing as early or produce as good quality fruit—at any rate, until the virgin richness of the soil is exhausted—as trees grown on somewhat poorer soil. Sandy, loamy forest land usually produces the finest quality fruit, but often requires

manuring to maintain its fertility; and virgin scrub and alluvial soils produce the most rapid growth, but usually at the expense of the quality of the fruit, which is thick skinned and of poor flavour. No shallow soils, clayey soils, swampy soils, heavy rich volcanic soils (whether red or black), poor whitish black or yellow sandy loams, are suitable for citrus culture, as they have all more or less heavy and impervious subsoils, and consequently become thoroughly saturated with stagnant water after heavy rains. No soils other than those recommended are naturally suited for citrus culture in this colony, though less suitable soils may be made to grow good trees and produce good fruit by systematic draining. Where it is possible to do so, I strongly recommend that land having perfect natural drainage should be selected rather than land that requires artificial drainage, even though the latter is in a better situation, and has better facilities for the marketing of the fruit. No matter how thoroughly the land is drained artificially, the results, especially during times of excessive and prolonged wet weather such as we often get during the rainy season, are not to be compared with those obtained on land that is naturally perfectly well drained. As I have already dealt fully with the question of orchard drainage in Part 3, Vol. I., of the *Queensland Agricultural Journal*, I will not go into this matter now, but will refer anyone wishing further information on this subject to what I then wrote.

The Selection of the Site for the Orchard.

In selecting a site for an orange orchard several very important matters have to be taken into consideration, as they have a great deal to do with the ultimate returns when the trees come into bearing.

In this colony the question of aspect is seldom one of vital importance, as in the coastal districts, at any rate, we have no killing frosts and are seldom troubled with dry, burning winds; at the same time it is preferable for the orchard to face from rather than to the west, as it is from the west that we get our heavy winter winds and any stray hot winds. The question of shelter is, however, one of the greatest importance, both from the hot and cold dry winds of the interior and from the strong north-east and south-east gales of our coasts. Belts of standing timber or scrub should always be left, as a protection to the orchard, on all exposed sides; or the site should be so chosen that it is naturally protected by higher land surrounding it. Throughout the coastal districts where there is usually an abundance of natural timber, this forms the best of shelter, but in the Western country, where timber is scarce, artificial shelter belts should be planted; such belts to be either of native trees suitable to the district or of introduced varieties of Eucalyptus, such as the Tasmanian Blue Gum. In some districts where the soil and climate is suitable, olives, though somewhat slow-growing at first, would eventually form a first-class breakwind, and at the same time have the advantage of producing a fruit of considerable commercial value.

Choose a piece of unbroken, nearly level, or only gently sloping land for the orchard; don't plant the trees on steep or rocky hillsides, or on land that is cut up with gullies or creeks. In many instances throughout the colony one is often tempted to believe that the orchardist has specially chosen the stoniest, steepest, and most inaccessible portion of his land on which to plant his orchard, apparently considering that any place is good enough to stick an orange tree, and seeming to forget that the tree requires constant attention, such as cultivation, pruning, destruction of fruit pests, &c., when it is planted. Though such land will and in fact does grow good oranges, the cost of production and marketing is increased enormously. On such land everything has to be done by hand, and at the dearest rate; whereas if the trees are planted on level land, practically the whole of the cultivation is done by horse labour, and the expense of pruning, destruction of fruit pests, and gathering the fruit is reduced by at least one-half. Such land can never be kept in perfect order, as heavy rains would wash away all the finer soil, and consequently it suffers more from dry weather than well-cultivated comparatively level land.

The time is soon coming when we will have to place our citrus fruits on the markets of the world in competition with those grown elsewhere, and unless we can reduce the cost of production by planting our trees on land that can be worked at a minimum of expense, and produce the best results, we are likely to be left behind.

There is also one other consideration in the selection of a site, and that is its proximity to a shipping point, either a railway or seaport; as no matter how good or suitable the soil, if the roads to it are so bad, or if it is so far removed from a shipping point that the cost of cartage is a heavy item in the cost of the production of the fruit, it will not be able to compete with orchards which are more favourably situated. In addition to the extra cost of raising the fruit as represented by the extra cartage, there is also a considerable loss owing to the extra knocking about that the fruit receives in transit from the orchard to the shipping point.

In selecting the site for the orange orchard, it is therefore advisable to take the following points into consideration, providing, of course, that the soil is suitable:—

1. The question of shelter.

2. The ease and cheapness with which the work of the orchard may be carried out.

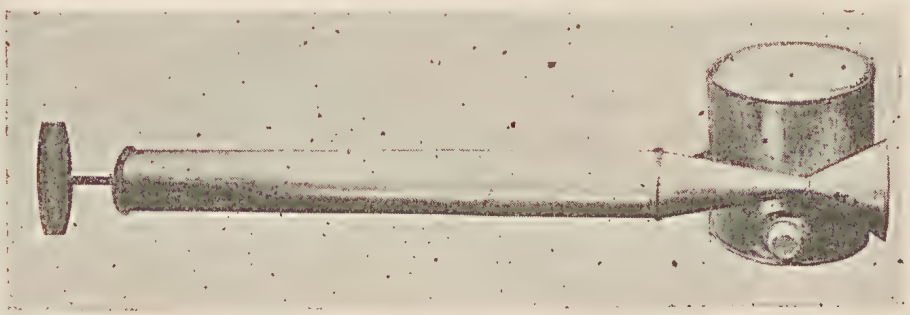
3. Accessibility to a shipping point.

4. The condition of the roads.

When these conditions are satisfactory and the soil suitable, then, and not till then, should you decide on planting a citrus orchard if you wish to make it a commercial success.

THE CYCLONE SPRAY PUMP.

Our illustration shows a new description of spray pump, patented, we believe, by Messrs. Anderson and Co., nurserymen, Sydney. It possesses the advantages of lightness, cleanliness, and effectiveness. It is especially adapted for ladies' use in the bush or hot house, being easily worked. It delivers a fine spray, which may be rendered heavier by working the plunger quickly. Used with a spraying fluid of lemon oil made thin, rose leaf, extract of tobacco,



tobacco soap, whale-oil soap, it is effective in searching out green fly or mildew on delicate flowers and roses. For orchids and ferns the spray should consist of ammonia sulphate. It is also useful for spraying the walls and roosts of poultry-houses.

All information concerning this instrument may be obtained from Mr. Pink, of the Agricultural Department, who has used it with success.

Botany.

POISONOUS PLANTS.

BY F. MANSON BAILEY, F.L.S.,
Colonial Botanist.

JATROPHA CURCAS, Linn.—THE PHYSIC-NUT.

SCARCELY a year passes without specimens of this poisonous shrub being sent to me for determination, with accounts of it having poisoned children who had eaten some of the fruit. Last month specimens of it were received by the Department from the town clerk, Charters Towers, who stated that it was locally known as "Bottle-tree," and also "Candle-nut," and was grown in many gardens on account of its fresh and shady appearance in the spring. With a view to placing persons on their guard against so dangerous a plant, it has been deemed advisable to publish a short notice, accompanied with a plate, in this *Journal*, by which it is hoped the plant will be easily recognised and eradicated from places within the reach of young children.

Description.—A small evergreen tree with smooth bark, leaves broadly heart-shaped, 7 to 5-nerved at the truncate or sinuate-rounded base, on a stalk 3 to 6 inches long, angular, 5 or rarely 3-lobed or sometimes entire, up to 6 inches across. Flowers yellowish in corymbs near the ends of the branches, corolla tube of male flowers hairy inside. Style glabrous, shortly 2-cleft. Capsules (fruit) ovoid, exceeding 1 inch in length, yellowish green. Seed nearly black, oblong, nearly $\frac{3}{4}$-inch long, the kernel enclosed in a thin white membrane. Native of South America.

Properties, Uses, &c.—Dr. W. Dymock, in his excellent work, "The Vegetable Materia Medica of Western India," states that . . . . The seeds of *Jatropha Curcas* are sometimes used as a purgative and alterative by the Hindu physicians, but on account of their uncertain action they are not much esteemed. . . . It is stated that if the embryo is wholly removed four or five of the seeds may be used as a purgative without producing either vomiting or griping, the acrid emetic principle residing chiefly in the embryo. . . . . A number of cases have occurred of poisoning by eating the seeds entire. In one case, a man who had eaten five of them soon complained of burning in the mouth and throat, and the whole abdomen felt distended and sore. In a few minutes vomiting occurred, and was repeated five times in the course of an hour, accompanied with active purging. The pain continued; the patient complained of feeling hot and giddy; he then became delirious, and afterwards insensible. On regaining consciousness several hours later, his face was pale, his hands cool, and the pulse 110 and weak. He recovered. . . . . In 1854, at Birmingham, more than thirty boys were poisoned by eating these seeds. In some of them, besides the symptoms just mentioned, there was a hot skin and an appearance of drowsiness, which may, however, have been due to exhaustion produced by the evacuations. They all made good recoveries. . . . .

A fixed oil (called in Canarese "Mara haralu unnay") is prepared from the

Plate CXCV.

PHYSIC NUT (JATROPHA CURCAS, *Linn.*).

seeds by steaming and pressing, and is used in China for oiling boats and woodwork. It is reckoned a valuable external application in cases of itch and herpes; it is also used in chronic rheumatism and for burning in lamps. The milky juice boiled with oxide of iron makes a fine black varnish.—*Cyclo. of India*, ii., 425.

According to Dr. Christison, in "Drury's Useful Plants of India," twelve to fifteen drops of the oil are equal to 1 oz. of castor oil. The juice of the plant, he states, has been applied externally in hœmorrhoids.

It is recorded that at one time the seeds of this dangerous poison plant were exported from the Cape de Verde Island to Portugal to the extent of about 350,000 bushels a year for the expression of the oil. Before expression, the seeds are slightly roasted and crushed, when the shells are easily removed. One thousand pounds of the seeds yield 640 lb. of the kernel, which give about 260 lb. of oil. From Portugal the oil appears to find its way to France, where it is supposed to be used in the manufacture of transparent soap.

Explanation of Plate.

1.	Male flower.	14.	Ovary and styles.
1'.	,, vertical section.	14=.	,, transverse section.
2.	Female flower.	17.	Fruit.
2½.	,, vertical section.	17½.	,, vertical section.
9.	Stamens.	18p½.	Seed.
11p.	Anther and part of filament.	18p.	,, vertical section.
12.	Pollen grains.	20.	Embryo.

From Mart. Flora Brasiliensis.

THE FRENCH VINTAGE IN 1899.

The *Moniteur Vinicole* publishes the official return, as prepared by the Commissioners of Indirect Taxes, of the French vintage in 1899. The acreage planted in vines shows an increase in thirty-two departments, but the total superficies is about 21,000 acres less than in 1898, being now given at 4,244,335 acres. The total production of wine last year was 1,079,613,800 gallons, which gives an average of 247 gallons per acre, or 81 more than in 1898. This is, so far as quantity is concerned, the most abundant vintage in France since 1893, when the total was about 1,130,000,000 gallons, and it is estimated that, so far as quality goes, the wine will be of about the same alcoholic strength as in 1898. According to the estimates made in each department, the total value of the wine made in 1899 is about £49,975,000, and of this sum only £4,576,000 represents the value of the better-class wines, which are for the most part exported.

The average production of wine in France for the last ten years has been 753,660,000 gallons, and the *Moniteur Vinicole* compares this with the production of other European countries, as follows:—

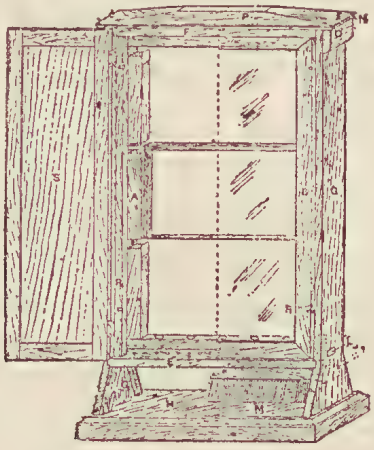
Country.	Average Production.	Country.	Average Production.
	Gallons.		Gallons.
France	753,660,000	Austro-Hungary ...	63,000,000
Italy	697,500,000	Germany	42,750,000
Spain	540,000,000	Turkey and Cyprus ...	42,000,000
Roumania	135,000,000	Greece	33,750,000
Bulgaria	32,380,000	Servia	24,750,000
Russia	73,125,000	Switzerland	7,965,000
Portugal	72,000,000		

Apiculture.

HOW TO MAKE AN OBSERVATORY BEE HIVE.

By H. R. STEPHENS,
Busy Bee Apiary, Toowoomba.

In order to watch what may be termed the "home life" of bees, special hives are necessary, and on this account are called observatory hives. The hive here described is intended to hold three frames of Langstroth size. Pine is a suitable wood for making the hive, but cedar may be used, although it would be more expensive. The internal dimensions should be in the same proportion as for an ordinary hive, with the proper bee spaces between the comb and glass. The hive consists of two cases—the inner case A, and an outer case G, into



which the former is fitted. The glass is fixed in a separate frame, which is held in place by four small buttons. The projecting ends of the top bar of the frame of comb rest on small pieces of tin plate. An outer shutter S should be provided to shut out the light as well as to retain heat. In stocking the hive, select three combs from the centre of a strong colony containing plenty of brood in all stages from the egg upwards. Lift them out, and place one at a time in the observatory hive, taking care that the queen bee is also moved in. It is advisable that a large proportion of the bees to populate the observatory hive should be young ones that have not flown, otherwise there is a great risk of depleting it through the old bees going back to the hive from which they were taken. It is quite possible to succeed without taking the queen with the bees, if the comb contains eggs or larvæ not more than three days old, from which the bees can raise a young queen; but in this case considerable time elapses before the progeny of the young queen is added to the population, which, meanwhile, will diminish somewhat in number, so that the results may not be so satisfactory as by the first method. The hive should be set up within doors—a warm outhouse or shed will do very well, or a room in a dwelling-house might be used for the purpose. A covered passage must be made through the wall to the outside for the bees. A small bracket landing-place should be arranged at the entrance to the hive, for the bees to alight upon. Although this is not the right time of

the year for starting an observatory hive, beekeepers could get one made in the winter, ready for the warm weather, as observing the ways of the bees under the glass is very interesting and instructive, and the hive always attracts attention at shows and exhibitions.

AUSTRALIAN HONEY.

By E. RAYMOND, Ipswich.

Apiculture, under existing circumstances, holds out little promise to those who would make honey-producing a means of livelihood. Many of those who have made a good start in the business, and have increased their stock to 60 or 100 hives, would willingly sell all and invest their capital in something more profitable. And who can wonder that the apiculturist should grow despondent with honey selling at the ridiculously low figure of from 1¼d. to 1½d., and on rare occasions 2d. per lb.? Were the seasons invariable and good, a living might be made at honey-producing even at this price. But we have to make allowance for an exceptionally severe winter, when the apiarist loses a large percentage of his stock which has to be reproduced during the following season; and we have also to make allowance for the dry season, when the surplus production of honey is very small. The apiarist, like the squatter, is subject to all the vicissitudes of and to all the inconveniences arising from bad seasons; but the former have only one honey crop during the year, and, if that is a failure, that whole year is lost to them. Taking all these circumstances into consideration, we beekeepers must confess that the prices obtained are insufficiently remunerative by far. Beekeepers all over Queensland raise a cry of dissatisfaction. "But what is responsible for these low prices? Is it the retailer's fault, or is it because of the inferior quality of the article as a food?" Not the former, because the shopkeepers are but the mediums through which the honey passes almost unaffected in price to the consumers; and certainly not the latter, for, when compared with our treacle and squashy tinned jams, the quality is far superior to either. Well, then, perhaps the fault lies with the public or even with the producers themselves. Here, I think, we come to the truth, and we may share honours, giving the lion's portion to the latter. The treacle-eater will pay his 7d. or 8d. for a 2-lb. tin of molasses, while he turns up his nose at a bottle of good honey, containing the same quantity, at a lower price. Yet who with any common sense would think of comparing the refuse cane juice with the pure nectar garnered from the hearts of a million tiny flowers? It is not, however, only the *fault* of the people that they do not appreciate honey at its worth, but also their *misfortune*. But the beekeepers themselves—they grudgingly part with their amber-coloured honey for 1½d. per lb., and then sit down, fold their hands in disgust, and trust to a merciful Providence to one day raise the price, contenting themselves in meantime by saying, "Better half-a-loaf than none at all." But I would sooner have the whole loaf any day. Each waits patiently for the other to do something for their common good, and everything remains in as bad a state as ever. This policy, however, will not "buy the child a frock." It behoves all interested to be up and doing for their own common good. Honey is, I believe, bringing 6d. and 7d. per lb. in London. Cannot our apiarists convene a meeting, form an association, and in some way bring themselves into touch with the home market? If they will by making an effort take the initiatory step, then work in unison, we have everything to assure us of the future prosperity of an industry which is, in America, and which should be in Queensland and Australia, an important and profitable one. Nature has provided us with a climate in every way adapted to the raising of early queens and early strong swarms, and has planted the land thick with honey-yielding trees for the bees to work on. It only remains for apiarists to put the coping-stone to Nature's handiwork by combining their strength and putting the industry on a solid basis.

Tropical Industries.

MACKAY SUGAR CONFERENCE.

AMONGST the subjects of interest to sugar growers and manufacturers, dealt with at the February conference, prominence was given to Dr. Maxwell's report on the sugar industry; and it would appear that the scientist's recommendations met with general approval, the only difference in opinion being on the "exact phraseology in which the Government should be urged to take steps to carry out our late visitor's recommendations" (*Mackay Sugar Journal*). The *Journal* further says:—

The opinion was at once expressed that the sugar industry should largely contribute to the expense naturally incurred by adopting Dr. Maxwell's recommendations, and we are very much mistaken if the conference also did not make it clear that, sooner than not secure the services of a first-class schoolmaster for our industry, the canegrowers and manufacturers would willingly pay the whole of the expenses. While we cannot shut our eyes to the fact that in many parts of the colony it will be argued that the Government has already considerably assisted the sugar industry, it yet remains certain that the presence of a first-class scientific agriculturist in Queensland will benefit the country in many ways, apart from the indirect benefit to be secured by the expansion and prosperity of the sugar industry. For instance, it is well known that such a man as Dr. Maxwell, who, we believe, is already being consulted as to the possibility of his transferring his services to this country, is not by any means inclined to confine his talents to advancing the sugar industry alone. While out here he was consulted on the subject of the pineapple disease, and it is certain that were he domiciled amongst us he would greatly assist many other industries dependent upon scientific agriculture for their successful continuance. Such being the case, it is hardly reasonable that we should be asked to pay the whole of the expenses of his being employed in the colony, no more than that the tobacco-growers should pay for a tobacco expert, the coffee-growers for an instructor in coffee culture, and so on. We believe the country will take a reasonable view of the matter, but we also unhesitatingly affirm that if Dr. Maxwell is prepared to come to Queensland the sugar industry will pay all the cost, sooner than not get him at all. As a natural corollary to so firm a belief in Dr. Maxwell and his recommendations, comes the decision of the conference to endeavour to organise the sugar industry into a definite body. The scheme outlined at the conference and adopted as a primary measure is fairly simple, maintaining as it does all local self-government amongst the smaller bodies, yet providing for a central head which will be able to guide the smaller bodies by means of recommendations into paths of progress and, we hope, prosperity. The association should be of the greatest service to whomsoever is at the head of our experiment stations, and we hope to learn that the farmers and manufacturers in the various sugar districts are taking up the business of organisation *con amore*. Altogether the conference gives hopes of considerable results, and our only regret is that, before it separated, it did not consider the question of holding a similar gathering, say, in another six months' time.

CENTRAL SUGAR MILLS, ANNUAL REPORTS.

NORTH ETON CENTRAL SUGAR COMPANY.—The annual report of this company for the year ending 31st December, 1899, although satisfactory from one point of view, has its gloomy side. The output of sugar, estimated at 1,430 tons, is below expectations, but it must be borne in mind that circumstances, over which no directors have any control, combined to create the deficit, which must be attributed to the disastrous frost of July and subsequently to the intermittent

rains which prevented the crops, not affected by the frost, from ripening. To these two causes, also, the directors attribute the extra weight of cane required to make a ton of sugar. On the other hand, working expenses have been diminished by the addition of labour-saving machinery, and judging from the appearance of the crops, which consist chiefly of plant cane, the directors have every confidence of a much better season this year. The present financial position of the company debars them from paying the annual amount of interest and redemption to the Government for 1899.

The cane purchased amounted to 14,176 tons 4 cwt. 2 qr., less 71 tons 11 cwt. 3 qr. for cane sold as plants. The average quantity of cane per ton of sugar was 9 tons 17 cwt. 1 qr., or 9 tons 3 cwt. 3 qr. per ton of sugar reduced to 88 per cent. net titre. The average price received for the sugar, exclusive of bonus, was £8 13s. per ton on a net titre of 94·45. The bonus is estimated at 20s. per ton. Average price paid for cane delivered at the mill, 12s. 10½d. per ton. The amount of wood consumed per ton of sugar was 1 ton 8 cwt.

Racecourse Central Mill Company.—The directors in their annual report also make reference to the frosts, which compelled them to commence crushing operations a fortnight earlier than was intended. Not only did the frost cause growers to suffer great loss, but the results in the mill also showed a serious falling off in the year's work, which was undoubtedly caused by the inferiority of the cane treated. Comparing the results of last year's operations with those of 1895, the falling off mentioned can be realised. This year the mill crushed 17,135 tons of cane for an output of 1,720 tons of sugar, whilst in 1895 the same quantity of cane yielded 2,251 tons or 531 tons more sugar. Taking the operations for the past season as a whole, only a small profit has been made, which profit will include the bonus. The following figures are self-explanatory:—

	Tons	cwt.	qr.	lb.
Cane purchased	17,180	19	0	0
Cane crushed	17,135	15	2	0
(Balance sold as plants.)				
Sugar made	1,720	0	0	0
Average quantity of cane per ton of sugar	9	19	0	27
Or at 88 net titre	9	6	1	20
Firewood consumed per ton of sugar	1	19	3	20

Average cost of cane per ton at rollers, 14s.

Average value of sugar sold, not including tank sugar nor bonus, £8 10s. 11½d.

The interest and redemption on the Government loan to the 31st December, 1899, have been paid.

Marian Central Mill Company.—At this mill also crushing was commenced earlier than usual, owing to the frost. To this and to the slow and irregular way in which the cane was delivered is attributed the unusually high cost of manufacture. Only 117 tons per day were delivered on an average, whereas 260 tons could have been dealt with with the same amount of labour and with a much less quantity of firewood.

The quantity of cane treated amounted to 21,858 tons, which was much below the original estimate.

The bonus is expected to reach £1 1s. per ton.

£1,000 had been forwarded to the Government against interest on loan account.

Cost of cane, 13s. 4¼d. per ton.

Average price for sugar account of sales received, £8 13s. 7d.

Average net titre for season, 95·17.

Cane used per ton, 88 N.T. sugar, 8 tons 4 cwt. 2 qr. 26 lb.

Cane used per ton, 95·17 N.T. sugar, 8 tons 18 cwt. 0 qr. 16 lb.

Sugar produced, 2,453·9 tons.

PLANE CREEK CENTRAL MILL COMPANY.—This mill began crushing on 17th July, and worked with a single shift until the 25th July, when a double shift worked till 4th October, and the crushing ended on 6th November. During this period 18,184 tons of cane were crushed for an output of 2,048·6 tons of 88 per cent. N.T. sugar (including sugar in tanks, &c.). Frosted cane was paid for under analysis, the basis being 10s. per ton for cane containing 12 per cent. of N.T. sugar. The first instalment of the bonus on sugar sold to the C.S.R. Company last season has been paid, equal to 10s. per ton. When the whole of the bonus has been received, £1,000 will be paid to Government for interest on loan. The directors note with satisfaction that the results of the year's working are far superior to previous years, attributable to judicious and careful management.

Average cost of cane at rollers, 12s. 8d.

Value of sugar sold as per return from C.S.R. Company, £8 11s. 0·77d.

Average quantity of firewood to 1 ton of 88 N.T. sugar, 17 cwt. 1 qr. 16·80 lb.

Average net titre, 94·05 per cent.

Average quantity of cane to 1 ton of 88 N.T. sugar, 8 tons 16 cwt.

Sugar produced, 2,048·6 tons.

ISIS CENTRAL MILL COMPANY.—Numerous important improvements and additions have been made to the mill and tram line, and a locomotive has been ordered. Seventy-seven acres of land were purchased for general mill purposes. Crushing was begun on 11th July, 1899, and finished on 2nd December, 1899. During this term 35,819 tons 10 cwt. of cane were crushed for a yield of 3,716 tons 6 cwt. of 1st, 2nd, and 3rd sugars.

The average N.T. of all sugars was 94·63, and that reduced to 88 N.T. amounted to 3,980 tons.

Tons of cane to 1 ton of sugar	9 tons.
Tons of wood to 1 ton of sugar	1 ton.
Cost of cane per ton at rollers	10s. 5¼d.

The operation for the season shows a gross profit of £11,949 0s. 2d. Allowing for depreciation, £2,793 14s. 2d., and Government interest, £1,710 0s. 9d., the net profit amounted to £7,445 5s. 3d.

PROSERPINE CENTRAL MILL COMPANY.—The results of the season's work at this mill are not so satisfactory as it was hoped they would be. The annual report says:—Up to the time of the severe frosts during the first week in July, the cane crops, although backward, were growing vigorously and gave promise of from 18,000 to 20,000 tons of cane, but, immediately after being frosted, growth stopped and decay commenced. Unfortunately, alterations and repairs to the mill machinery prevented the commencement of crushing until 1st August, which ended on the 8th November. During this period 13,056 tons of cane were crushed, yielding 984 tons of sugar. After crushing commenced, the cane operated on was found to be immature and of low density; it deteriorated very fast, a large percentage was rejected in the fields and at the mill, and over 2,000 tons were left uncut, being unfit for crushing.

Had we been spared this frost and our reasonable expectations realised, we should have had 2,250 tons of sugar, and been able to pay 12s. per ton for cane, together with the Government interest for this year.

During the year we have done all that we could to encourage cane planting, having made small advances to those who required it in order to plant new land, and in consequence the area under cane has been considerably increased and the crops generally look promising.

An extraordinary meeting of shareholders having been held on the 9th December to take under consideration the present position and future prospects of the company, and certain resolutions passed, Mr. McCulloch was sent by the Department to make full inquiries and to report to the Government; and we are to-day (February 15th) in receipt of a telegram from the Under Secretary stating that the Government are agreeable to take over the mill according to the resolutions of shareholders passed on the 9th December, 1899.

We anticipate that for next season's crushing we shall not have less than 24,000 tons of cane for the mill, which should produce 3,000 tons of sugar; but as the mill is capable of dealing with more than double that quantity we trust every shareholder will do his utmost to not only increase the area under cane, but try to improve the system of farming, so as to produce heavier crops and greater percentage of sugar.

	Tons	cwt.	qr.	lb.
Cane crushed	13,056	0	0	0
Sugar made	984	0	0	0
Average quantity of cane to 1 ton of sugar, 80 N.T.		13	5	1
Average quantity of firewood to 1 ton of sugar ...		2	4	3

Average cost of cane at rollers, per ton, 7s. 9¾d.

Moreton Central Mill, Nambour.—This mill was run last season under the control of the Department of Agriculture. There was not a large crop of cane to put through the rollers, the total quantity being 11,009½ tons, which resulted in the production of 1,111½ tons of sugar. The amount paid for cane at the rollers was £6,084 15s. 10d. The profit on the year's work after allowing for Government interest, but not including depreciation, was £308 5s. 11d.

	Tons	cwt.	qr.	lb.
Average cane to 1 ton of sugar	9	18	0	12
Average cane to 1 ton of sugar reduced to 88 N.T.	9	10	3	6
Average firewood to 1 ton of sugar	1	15	2	4

	£	s.	d.
Value per ton of sugar sold, including bonus, freight allowance, and tank sugars	9	17	4
Cost per ton of cane at the rollers, including haulage	0	11	0½

In order to encourage a further supply of cane in the future, it has been arranged to pay 10s. per ton all round, delivered on trucks within a radius of eight miles from the mill, and it is confidently hoped that the growers will respond to this by increasing their cultivation, and thus ensure a regular and full supply of cane to the mill. Judging from the acreage now under cane (830 acres), the crop for the coming season should show a considerable increase on last season's production. The weather of late has been favourable for growth, and the cane is coming on splendidly, and some put down the probable crop at from 15,000 tons to 16,000 tons.

Mossman Central Mill Company.—The report and balance-sheet of this company brings results up to the 28th February last. The results appear to afford good ground for satisfaction on the part of the shareholders.

The quantity of cane crushed amounted to 47,592 tons, producing 5,636·5 tons of sugar of 88 per cent. N.T.; 3,500 tons of cane crushed had been damaged by floods, and consequently did not produce a full quota of sugar.

	£	s.	d.
Total value of sugar produced	50,000	10	10

	Tons	cwt.	qr.
Tons of cane to 1 ton of sugar	8	8	3

	£	s.	d.
Cost of cane at the rollers, per ton	0	11	0
Cost of manufacture, per ton	1	2	5
Gross profit for the season	9,082	14	4
Estimated bonus per ton	1	1	0
Interest on Government loan and redemption paid to 31st December, 1899	2,943	9	9

The crop for the coming season of 1900 promises very well indeed, and generally the outlook is most encouraging.

CHILE PEPPER CULTURE.

MR. J. B. NEFF, of Anaheim, California, discourses on chile pepper culture, in the *California Cultivator*, on the basis of his own experience as a successful producer of hot stuff.

How Plants are Grown.—A hotbed is made by excavating about 16 inches deep; fill in to within 4 inches of the top with damp stable manure, tramping down very solidly. Spread about 4 inches of sandy loam over the manure. The seed is sown quite thickly over the loam, and then about ½ inch of loose, sandy soil placed evenly over it, and all kept damp. When the plants have two or three leaves, thin to 1½ inches apart each way. The plants must be watered while in the hotbed by sprinkling. Great care should be taken to protect from frost.

Soil and Preparation.—Rich, sandy soil is the best for the chile pepper. It should be ploughed deeply, and be put in a state of thorough cultivation. Ridges should be made 3 feet apart, and the plants set 2½ feet apart on the ridges. All plants must be on a water line, and to get this the ridges should be made, water run down the furrows, and the plants placed about 2 inches above the water mark. This insures every plant receiving water when irrigated. Plant as soon as danger from frost is past.

Cultivation.—Frequent cultivation is necessary until the plants get too large to allow of a cultivator and horse passing between the rows. All weeds must be pulled out. When the plants are set as before noted, all the ridge will be on one side. This must be worked down with a cultivator, and then a plough used to throw earth on either side of the furrow, so that the plants will be midway on the ridge.

Irrigation.—While the plants are small water will be needed about once in twenty days, but as they get larger it will be needed as often as once a week, though only in small quantities. The plants seem to have no deep roots, consequently the surface soil must be kept damp.

Picking.—The field should be gone over about once a week after the peppers begin to ripen, all that are fully ripe being taken off. Great care must be exercised to pick all the stem with the pepper. They should be allowed to lie in the sun one day after being picked in order to toughen the stems and prevent them breaking during the process of curing.

Stringing.—The common method is to cut strings of strong, smooth twine 8½ feet long. Draw this through a needle about 10 inches long, which is often made of a bicycle spoke. Peppers having any breaks or blemishes must be thrown away, as they would decay before drying properly. Of course, where an evaporator is used these can be saved. After the strings are full and tied they are hung on nails driven into a rough pole or other framework standing about 6 feet from the ground, and left until dry; or if shelter is available they may be moved before becoming fully dry and hung closely together under such shelter, but where there is a free circulation of air.

Evaporating.—Many growers prefer evaporating instead of drying. The evaporators used are of various designs and sizes, but they should be large enough when the peppers are dried on strings to hold not less than 500 strings. The usual plan is to have a furnace with several turns of 8 to 10 inch pipe in the basement, the peppers being placed in the second story over a very open floor and with good ventilation. The temperature must be kept at 110 degrees Fahr., and in this way the house can be refilled about every four days.

Yield and Price.—Both of these, of course, vary with the season, soil, and water supply. Two hundred and fifty strings of 5 lb. each is called a paying crop, but with all conditions favourable, including a late, warm season, as high as 400 strings, or even 2,400 lb. per acre, of dried peppers may be grown. Prices range from 35 to 75 cents per string if sun dried, and 7½ to 12½ cents per lb. if evaporated.

VANILLA IN RÉUNION (BOURBON).

Mr. Consul Bennett, in a report to the Marquis of Salisbury on the agricultural industries of the island of Réunion (or Bourbon, as it is also named), published in a bulletin (Vol. VII., part 2) of the Botanical Department, Jamaica, has something to say about vanilla which should be "made a note of" by our Northern planters. Few of either our planters or farmers think of going in for what the French call *la petite culture*, not as a substitute for sugar, coffee, or bananas, but in connection with it. Mr. Bennett says:—

But Réunion would be in a far worse plight to-day than she actually is if she had depended entirely on sugar. It is hardly too much to say that her planters, or many of them, have been saved from ruin by having a second string to their bow. Many a deficit on sugar has been covered by a handsome profit on vanilla, backed up by sales of manioc (cassava), coffee, tobacco, perfumes, cloves, and market garden produce.

The largest of all these secondary products is undoubtedly vanilla. There is hardly a sugar estate in the island which has not more or less land under vanilla, varying naturally in extent according to the nature of the locality. On the other hand, in certain districts are to be found large planters who cultivate nothing but vanilla; and as regards the quarters of Ste. Rose, St. Philippe, and St. Joseph, it is no exaggeration to say that the mainstay of the people is vanilla. The yards and courts and little plots of ground round the huts are covered with the vanilla creepers. When the pods are ripe they are sold green to a neighbouring merchant, realising quite a small fortune for the grower. The only drawback to this crop is that it gives rise to an immense amount of theft and dishonesty. The pods are stolen by night, and in spite of stringent laws are passed from hand to hand, and finally lost for ever to the grower. Many considerable fortunes are known to have been accumulated by illicit vanilla buyers, but the detection of the culprit is almost as difficult as that of a diamond thief at the mines.

In a separate report attention is drawn to the treatment of vanilla by chloride of calcium. We print this latter report in full, as it may yet prove of value to some enterprising sugar-planter of North Queensland:—

EXPLANATORY NOTES AS TO THE DRYING OF VANILLA BY CHLORIDE OF CALCIUM.

The object aimed at in the treatment of vanilla is to endow it with keeping properties, and at the same time to develop the perfume which has not yet come into being at the moment of cropping.

Pods of the best quality should be perfectly smooth, and without excrescences or holes. The longer the pods, and the more perfumed they are, without acidity, the more valuable the vanilla.

The success of the treatment of vanilla depends upon the care bestowed upon it, and especially upon the state of maturity of the pods.

If the vanilla is picked too green, its treatment will be difficult and its keeping qualities doubtful, the pods will be thin and poor after drying, whilst the perfume will not be properly brought out, and what there is will be lacking in quality.

If plucked when too ripe, the treatment will be easy, it will be of good size, and highly perfumed, but it will split, and thus lose much of its commercial value.

On a well-ventilated and properly exposed plantation, the pods are ripe when the lower part begins to turn yellowish.

The treatment by chloride of calcium, $CaCl_2$, as indeed do all the other methods of treatment, consist of several operations—

1. Stoppage of vegetation.
2. First drying and colouring.
3. Drying.
4. Watching.

1. The process of drying in a stove, by means of hot water, is the one resorted to. On the day of the cropping, or the next day at latest, the pods are put to dry by heat in thin cases of the following dimensions :—0·220 metres by 0·220 metres by 0·350 metres. Old petroleum oil tins are generally used for the purpose. The size may be slightly altered, but the width and breadth of the box should not be too large, as the vanilla in the centre should be subjected to the same heat as that which is nearest to the sides of the box. Otherwise the treatment of the pods in the centre would not be assimilated to that of those at the sides, and the resultant colouring would be slightly different.

These boxes are fitted with lids closing on the outside of the box. They are lined with wool carefully arranged along the bottom and up the sides, and a little over the top of the sides.

The vanilla pods are placed on end close enough to secure pressure without damage by rubbing ; a horizontal layer is placed on top of these, the woollen covering is folded over all and the lid put on.

The boxes thus arranged are put into the halves of wine barrels, and hot water emptied into the barrels up to the lid of the boxes, care being taken that no water gets into the boxes. In order to prevent the sudden cooling of the hot water, the barrel is covered with a piece of sacking. It is left thus covered during one night.

2. Next morning the pods are withdrawn and exposed in the air for some time to dry ; then for two or three days they are kept under woollen coverings in full sunlight.

For this operation low wooden boxes are used, a single layer of pods being placed in the bottom and covered with a woollen cloth. The boxes are placed in sunlight on trestles to prevent contact with more or less moist earth. After this operation the colouring of all the pods will be uniform if the drying by hot water has been properly done.

Now is the moment to proceed to the drying operation.

3. The old methods of preparation, drying in the open air upon screens in an airy situation, or in hot-air stoves, in which the heat is constantly renewed, result in a loss of perfume, and at the same time require a large amount of hand labour. These drawbacks are avoided by drying in closed vessels by means of chloride of calcium, $CaCl_2$.

This operation is carried on in boxes of galvanised iron with a hinged door and closing on an indiarubber edging to ensure air-tightness.

Each box has eleven drawers or trays ; the bottom and the sixth drawers are for the vessels containing chloride of calcium, the others are for holding the vanilla ; in the former are placed 18 kilos. of chloride of calcium and in the latter 45 kilos. of vanilla.

The vanilla is laid upon wooden hurdle-shaped frames resting upon little brackets riveted into the sides of the box. The tray can thus be drawn out in order to arrange the vanilla properly. Several layers are placed on each tray.

The trays should not be made of resinous or smelling woods, as vanilla absorbs and retain odours it comes in contact with ; the hurdling is made of split rattans.

The vessels containing chloride of calcium should be double bottomed, the inner one being perforated to allow of the escape of the liquid chloride of calcium. Each time the case is open the chloride vessels should be looked to, and the chloride renewed or added to as necessary. When the trays are filled with

vanilla and the chloride vessels are in their places, the door is closed and should fit perfectly into the doorjamb. To be quite sure that the boxes are hermetically closed, all rivets in the box should be soldered beforehand.

Every two or three days the vanilla is carefully examined, and pods showing moisture are taken out and put aside to be sunned and prepared by themselves in a special box where they are all collected.

In from twenty-five to thirty days the vanilla will have reached the required degree of dryness. Practice will show the exact moment when they should be withdrawn.

Vanilla insufficiently dried will not keep, and breeds small worms; vanilla over-dried keeps well, but it is not supple, it is called "broken" (*brisée*) and has less commercial value.

4. After leaving the box, the vanilla is placed for several days on small frames in a covered and well-ventilated place, then it is removed and shut up in tin boxes, each holding from 15 to 20 kilos. of vanilla.

There it remains for several weeks, being examined every two or three days, and any showing traces of mildew are carefully wiped.

When it is thought that the vanilla has reached perfection (*rendue à point*) and its perfume well developed, the cleaning of the vanilla is taken in hand in order to remove the dust and the germs of mildew which may adhere to it. Vanilla which is not subjected to this process is dull in colour and does not keep well.

Twenty-five to thirty litres of water at about 60 per cent. (140 degrees Fahr.) are emptied into a perfectly clean receptacle and 15 to 20 kilos. of vanilla are thrown into it and vigorously stirred up in the water by hand.

The pods are withdrawn, lightly wiped and put to dry in the shade. In a few days, when the pods are dry, they are sorted and classed according to length and quality, and made up in bundles. All these operations must be conducted with the greatest care. The bundles are placed in tin boxes with covers. Each box contains only vanilla of the same length and quality, and holds from 4 to 5 kilos. each.

Vanilla should never be sent away immediately after dealing with it. It must be watched for at least a month to be quite sure that it will keep good during a sea voyage.

During the time it is being watched the boxes should be examined twice a week, and every pod showing the least trace of moisture should be withdrawn.

The mildewed pods are worked up by various processes and sold as quite inferior vanilla.

SUGAR EXPERIMENT STATION, MACKAY.

In his report on the work being carried out at the above station, Mr. A. Ramsay says that in carrying out experiments care has been taken to have all plants exactly alike, and to give similar treatment to each in every respect, the only difference being in the description of manures applied. The experiments were originally started as preliminaries to determine in what direction further and more complete experiments of the same nature should be made. The various green manures growing on the station would be shortly analysed. Of the manuring experiments being carried out at Palmyra and the Six-Mile, Mr. Ramsay says that there were so many misses and failures of supplies that any information obtained in this direction would but be misleading. One thing, however, has been clearly demonstrated at Palmyra—namely, that nitrogenous fertilisers give the best results there. The most interesting results will be obtained from a field of cane divided into blocks of eight beds of sixteen rows, these being alternately manured and unmanured. When this cane is cut, full particulars of profit or loss on the operations will be given.

SUGAR EXPERIMENT STATION, MACKAY.
REPORT ON CROPS FOR MONTH ENDING 31ST MARCH, 1900.

Name of Crop.	Planted.	Area.	Drilled or Broadcast.	Manure Applied. Name.	Manure Applied. Cwt. per Acre.	Rain during Month.	Treatment during Month.	Growth during Month.	Date Harvesting.	Quantity Harvested per Acre.	Total Quantity Harvested.	Yield per Acre.	Remarks.
		Acr's										Tons.	
Sorghum A2	27-9-99	·47	Drilled	Standard phosphate	2	...	...	...	...	..	...	36·3	Being used for horse feed. 4 rows unmanured yielded 20·4 tons per acre.
				Potash sulph.	1								
A3. Cow Pea	28-9-99	1·23	,,	No	...	...	..	...	...	...	...	10·94	74 acres ploughed in after collecting. Balance to stand.
A4. Small Mauritius Bean	1-11-99	·05	,,	,, ...	...	...	...	...	...	...	...	...	Very backward, but making growth now.
A4. Velvet Bean... ...	1-11-99	1·89	...	,, ...	...	...	...	...	...	...	...	...	Better than last-named, but backward.
A5. Cow Pea	12-1-00	·45	...	...	...	...	...	...	...	...	...	...	Very little vine, but abundance of seed.
B0. Cane	...	1·10	...	...	...	...	Weed & trash	...	...	...	...	...	Several stools each of New Guinea varieties.
B0. Pineapples	Sep., '99 to Feb., '00	·20	...	...	...	...	Scarified & weeded	...	...	...	...	...	
B0. Sorghum	23-11-99	·25	Drilled	No	...	...	...	...	...	...	...	12	Ploughed in as green manure.
B1. Thirteen Orange trees	...	...	...	...	...	...	...	Little ...	...	...	...	...	Cyanided for scale.
B1. Small Mauritius Bean	21-11-99	·59	Drilled	No ...	...	...	...	...	...	...	...	...	Very irregular and very poor crop. Small Mauritius bean now making growth. Field pea complete failure. Narico bean most irregular; bad seed.
B1. Field Pea	21-11-99	·26	,,	...									
B1. Narico Bean	21-11-99	·39	,,	...									
B2.[1] Small Mauritius Bean	16-9-99	·08	,,	Phosphate ...	2	...	...	...	...	...	13·6		Seed pods not yet ripe. Two rows of peach trees formerly growing here, and beans showed poor growth along line of trees.
				Potash sulph.	1								
Velvet Bean... ...	16-9-99	·38	,,	Same ...							15·6		
Black Mauritius Bean	16-9-99	·01	,,	,, ...							17·1		
B2.[2] Cow Pea	18-9-99	·39	,,	None ...	...	...	...	...	...	...	...	11·8	Allowing to stand for observation.
Small Mauritius Bean	18-9-99	·31	,,	,, ...	...	...	...	...	...	...	...	13·6	
B4. Cow Pea	23-2-00	·40	,,	,, ...	...	...	...	...	...	...	...	...	Wanting rain; making little growth.
B5. Velvet Bean... ...	4-11-99	2·24	...	,, ...	...	...	...	...	...	...	...	18·3	Very good and even crop.
C0. 1. Narico Bean ...	22-11-99	·41	...	...	...	...	...	...	...	...	...	...	Poor crop; most unsatisfactory results.
C2. 3-4. Velvet Bean ...	14-11-99	1·36	...	..	...	...	...	...	...	...	...	...	Made little growth for a long time, but making up now.
Outside. Cow Pea ...	20-2-00	2·16	...	...	...	...	...	...	...	...	...	...	Came up well, but badly wants rain.
Grape Vines. Four rows	...	...	...	...	...	...	...	...	...	...	...	...	Sulphuring for mildew.

NOTE.—Velvet Bean vine was chaffed and given to the horses, but they did not seem to care for it.

Purpose of Experiment.	Crop.	Area.	Planted.	Drilled or Broadcast.	Manure Applied at the Rate of—	Method of Application.	Treatment during Month.	Rain during Month.	Growth during Month.	Details of Experiments and Remarks.
		sq. yds.								
To determine growth and results of these as green manures and for analysis	Sport of Blk. Maur	2	8-3-00	Broadcast at the rate of 1 bushel per acre	None	...	...	...	...	Good growth and vine healthy.
	Poor Man's Bean...	2	,,							Good and healthy, but few leaves yet.
	Narico Bean ...	2	,,							Slow; healthy; but not vining.
	Sm. Maurit. Bean	2	,,							Very good, and healthy.
	Madagascar Bean.	2	,,							Very poor, and sickly.
	White's Per. Cow pea	1	,,							Good, but not very healthy, and no vine.
	Velvet Bean ...	1	,,							Very good, and healthy.
	Black Cow pea ...	1	,,							Not vining at all, and leaves sickly.
As above; also for roots, &c.	Sport of Blk. Maur.	1	5-3-00	Planted in 6 in. drain-pipes and 4 seeds in each	... ...	...	...	...	...	Made very good growth.
	Poor Man's Bean ..	...	...							Good growth.
	Narico Bean ...	...	...							Growth slow, but healthy.
	Sm. Maur. Bean ...	...	...							Made good growth.
	Madagascar Bean	...	...							Poor growth, and sickly plants.
	White's Per. Cow pea	...	...							Fair growth; not healthy.
	Velvet Bean ...	...	...							Made good growth.
	Black Cow pea ...	...	...							Not at all healthy.
										The results of these are not yet available, but on 14th March there were—
Various ...	Cane variety— White Bamboo...	No. 1	Planted in sand, in boxes, May 29, and first started to make cane February 1900		4 cwt. pot. nitrate, 4 cwt. ammon. nitrate, 4 cwt. sodium phosphate, 1 cwt. calcium sulphate	Applied at intervals in solution or suspension	Watered and trashed	...	...	19 canes (28 canes and shoots), average height of cane 6·8 inches, equal to 129 inches of cane.
	White Bamboo...	2			6 cwt. ammon. nitrate, 1 cwt. calcium sulph.		Watered and trashed	...	...	8 canes (18 canes and shoots), average height of cane 16·74 inches, equal to 134 inches of cane.
	White Bamboo ..	3			6 cwt. sodium phosphate		Watered and trashed	...	...	6 canes (8 canes and shoots), average height of cane 12·5 inches, equal to 75 inches of cane.
	White Bamboo...	4			Unmanured		Watered and trashed	...	...	4 canes (8 canes and shoots), average height of cane 2 inches, equal to 8 inches of cane.
										Boxes are 23 x 30 x 17 inches. The percentages of nitrogen in the first lot of trash were— 1, ·568; 2, ·564; 3, ·560; 4, ·553.

The above report cannot give the final results of experiments in course of trial, but in subsequent issues these will be given in full.—Ed. *Q.A.J.*

Forestry.

BRIEF NOTES ON SOME TIMBER TREES OF THE BURNETT DISTRICT OF QUEENSLAND.

BY J. W. FAWCETT,
Member of the English Arboricultural Society.

THE following is a list of some of the timber trees growing in the Burnett district, with their characteristics, qualities, and uses, compiled by me in 1897 at the request of some of the residents in that district who were interested in forestry. Only the chief and more prominent species are described. I have given as many of the common English names as possible, none of which, however, are local; those names within inverted commas are the aboriginal names of the species in the Burnett district:—

CAPPARIDEÆ.

1. *Capparis nobilis*, F. v. M.—Mock Orange, Native Orange, Native Pomegranate.

A small scrub tree, with generally a crooked stem, oblong leaves, and large, showy, white but very fragile flowers, in bloom from November to January, edible fruit, yielding a firm, hard, close-grained, light-coloured timber.

PITTOSPOREÆ.

2. *Pittosporum rhombifolium*, A. Cunn.—Diamond-leaved Laurel.

A fine scrub tree, with glossy foliage, and small white jasmine scented flowers, in flower from December to February, with tough whitish timber, but little used.

3. *Pittosporum undulatum*, Vent.—Bastard Orange, Mock Orange, Hedge or Native Laurel.

A medium-sized scrub tree, with fragrant white blossoms, in flower from August to October. The timber is soft, tough, close grained, and light coloured. The distilled oil from the flowers of this tree has a jasmine-like odour, but is bitter and hot.

4. *Bursaria incana*, Lindl.—Native Olive.

A small erect tree, with somewhat hoary-white foliage and small white flowers. Found generally in open country; yields a close-grained, light-coloured timber.

5. *Citriobatus multiflorus*, A. Cunn.—Native Orange; Orange Thorn.

A small thorny tree or large shrub, with small whitish flowers (June to August), and the fruit a small round yellowish berry, like a diminutive orange; yields a tough, close-grained, light-coloured timber.

6. *Citriobatus pauciflorus*, A. Cunn.—Native Orange; Orange Thorn.

A thorny shrub, with larger flowers and fruit than *C. multiflorus;* yielding a hard, close-grained, yellowish-white timber.

MALVACEÆ.

7. *Hibiscus heterophyllus*, Vent.—Wild Rosella; Green Kurrajong, "Kayan."

A small scrub tree, with rough or prickly foliage, and large white flowers, each with a purple centre (March to May); yields a tough, open-grained, pale-yellow timber. From the fibre of the bark a good twine is manufactured, which is used by the aborigines for making fishing lines and nets.

8. *Hibiscus tiliacus*, Linn.—The Queensland Coast Cotton Tree; "Koonmarim."

A small tree, found in the coastal districts in close proximity to saltwater, with large orbicular leaves, and large yellow flowers, each with dark-crimson centres (October to December); yields a soft, beautifully marked, close-grained, invisible-green timber, which is easy to work, takes a good polish, and a pretty wood for cabinet work. The bark yields a fibre used by the aborigines for making fishing lines and nets.

STERCULIACEÆ.

9. *Sterculia quadrifida*, R. Br.

A medium-sized deciduous scrub tree, with oval hairy leaves, and greenish flowers (November and December), succeeded by bright-red pods, containing oval black edible seeds. The timber is light, close-grained, soft, and of a greyish colour. The bark yields a useful fibre, used by the aborigines for fishing lines and nets. The seeds are edible and have an agreeable nut-like flavour.

10. *Sterculia diversifolia*, G. Don.—Black Kurrajong; Rattletrap Tree; Yam Tree.

A small tree with stout, or thick, smoothish stem, glossy lobed leaves, brownish bell-shaped flowers (October to December), and prickly hairy seeds in oval pods. Found on the ranges, yields a soft coarse-grained yellowish timber.

11. *Sterculia rupestris*, Benth.—Narrow-leaved Bottle Tree.

A medium-sized tree with stout, somewhat bottle-shaped trunk, and bell-shaped flowers (September to November), yielding a soft spongy timber.

12. *Tarrietia argyrodendron*, Benth.—Ironwood; Black Stavewood; Silver Tree.

A large, tall, "Nangarin" scrub tree, with the foliage of a silvery appearance on the underside, and small white paniculate flowers (July). Yields a firm, hard, tough, close-grained, whitish timber.

13. *Commersonia echinata*, Forst.—Brown Kurrajong.

A small tree, or large shrub, with the young branches and leaves generally covered with a cottony down; found in scrubs or river banks. It yields a close-grained, light, soft, whitish timber. The bark furnishes a strong fibre used by the aborigines for making kangaroo nets and fishing nets and lines.

TILIACEÆ.

14. *Elæocarpus obovatus*, G. Don.—Native Ash; Pigeon-berry Tree; Tiny Quondong.

A medium-sized scrub tree, with oval leaves, small white flowers (December to March), and oval blue fruit; yields a firm, close-grained, light, tough, light-coloured timber.

LINEÆ.

15. *Erythroxylon australe*, F. v. M.

A small-sized tree or large shrub, with small oblong leaves and small pallid flowers (January to March), and a drupaceous fruit (ripe in April and May). It yields a hard, fine-grained, prettily marked reddish timber. The leaves furnish a yellow dye.

RUTACEÆ.

16. *Evodia micrococea*, F. v. M.—Mountain Ash.

A fair-sized tree of hilly scrubs, with three leafletted leaves, dense cymes of small flowers, and small roundish rough fruits containing shining black seeds; yields a tough, close-grained yellowish timber.

17. *Zanthoxylum brachyacanthum*, F. v. M.—Australian Satinwood; Moreton Bay Yellow-wood; Thorny Yellow-wood.

A small slender scrub tree, with the trunk and branches covered with short conical prickles; deep-green and often glossy leaves, and small white flowers (November to January); yields a handsome, close-grained, glossy yellow timber, easily wrought and susceptible of a high polish; useful for cabinet work and wood engraving.

18. *Geijera Muelleri*, Benth.

A handsome medium-sized scrub tree, with deep-green glossy foliage, which on being rubbed in the hand gives out a strong fragrance, oval leaves, and small white flowers (June to August). Yields a hard, close-grained, nicely marked timber, the heartwood being darkly clouded and the sapwood a light colour. The bark yields a good nankeen dye.

19. *Geijera salicifolia*, Schott.—Ink-bark Tree; Tallow-wood.

A moderate-sized scrub tree with slender drooping branches, oblong leaves, often hoary on the underside, and very small white flowers (July). Yields a firm, hard, close-grained, nicely marked yellowish white timber of a somewhat greasy nature. The bark yields a dark-coloured dye which makes a good substitute for ink.

20. *Acronychia Baueri*, Schott.—Scrub Ash; Scrub Yellow-wood.

A small-sized scrub tree, having the young shoots and inflorescence more or less mealy, and white flowers (January to March); with a durable, hard, closely grained, brownish yellowwood, use for cabinet work, and taking a good polish.

21. *Acronychia laevis*, Frost.—White Lillypilly.

A medium-sized scrub tree, often growing tall and slender, with greenish white flowers (December to February) and an edbile fruit, yielding a hard, close-grained, light-coloured timber.

22. *Micromelum pubescens*, Blume.

A small, slender, scrub tree with alternate pinnate leaves; corymbose flowers and oval red downy berries, yielding a closely grained whitish timber.

SIMARUBRÆ.

23. *Ailanthus imberbiflora*, F. v. M.—Tree of Heaven.

A moderately large scrub tree, with the leaves pinnate, and divided into from 15 to 17 leaflets; small flowers (October to December) and the fruit with a wing 2 inches long. Found only towards the Mount Perry district. Yields a light, soft, porous, yellowish timber.

BURSERACEÆ.

24. *Canarium australasicum*, F. v. M.—Australian Kanary Wood.

A medium-sized tree, with thick branches, pinnate leaves of about seven leaflets; very small flowers and small oval fruits; found near the Upper Burnett, yielding a easily wrought greyish timber, useful for lining-boards.

MELIACEÆ.

25. *Turræa pubescens*, Helen.

A small deciduous scrub tree, with oval leaves and showy, fragrant, sweet-scented flowers, found in the higher districts, and yielding a hard, close-grained timber, with dark-coloured heartwood and yellowish sapwood.

26. *Melia composita*, Willd.—White Cedar.

A large elegant deciduous scrub tree, with mealy twice or thrice pinnate leaves; clusters of small blue or lilac fragrant flowers, which appear (September to November) just before the foliage, and a yellow ovoid drupe (ripe December) containing a fluted stone; yields a soft, light, easily wrought, reddish timber; used for lining-boards, packing-cases, boat-building, and shingles, but neither durable nor strong unless obtained from well-matured trees.

27. *Dysoxylon Muelleri*, Benth.—Pencil Cedar; Pencilwood; Turnip-wood.

A fine and often large tall tree, found in the alluvial scrubs, with bright-green foliage, and rather large paniculate flowers; yielding a valuable, easily wrought, prettily marked, red timber; useful for cabinet work and interior fittings.

28. *Synoun glandulosum*, A. Juss.—Scrub Bloodwood; Dogwood; Rose-wood.

A moderate-sized, evergreen scrub tree, with pinnate leaves, small paniculate flowers (May to July), and an almost globular capsule; yielding a firm, easily worked, fragrant, reddish or rose coloured timber; useful for cabinet work.

29. *Owenia venosa*, F. v. M.—Crow Apple; Sour Apple; Sour Plum; Tulip-wood.

A moderate-sized scrub tree, with pinnate leaves, small paniculate flowers, and the fruit a globular, acidulous, edible drupe. The timber is hard, close-grained, very strong, and durable, of a lighter or darker reddish or rose colour; it possesses first-class polishing qualities, and is valuable for cabinet work.

30. *Cedrela Toona*, Roxb.—Red Cedar; Australian Cedar; "Koolaman"; "Wood-tha," or "Woota."

A large deciduous scrub tree, with pinnate leaves, small paniculate flowers, and short fruit capsules; yields a valuable, easily wrought, durable, beautifully grained, dark-red timber; useful for cabinet-making, furniture, and internal fittings; never very plentiful in the Burnett district.

31. *Flindersia australis*, R. Br.—Crow's Ash, Flindosa, Flandowzie; Yellow-wood, Native Ash; Native Teak.

A large sized scrub tree—often the tallest tree in some scrubs—pinnate leaves, numerous white flowers in dense or much branched panicles, and rough woody fruits; yields a very hard, close-grained, compact, durable, strong, yellowish timber, useful for house-building and railway purposes, and also for staves. It has excellent dyeing properties, and is capable of a good polish. On account of its hardness, being difficult to cut with the axe and to saw, it is not a favourite and not much sought after.

32. *Flindersia Oxleyana*, F. v. M.—Common Yellow-wood; Light Yellow-wood.

A tall and much branched scrub tree, with smooth bark, leaves crowded at the ends of the branches, flowers in loose terminal panicles, and woody fruits. The timber is close grained, durable, hard, strong, and of a bright or clear yellow colour, especially when freshly cut, and often finely marked. It is liable to warp when exposed to the weather. It possesses dyeing properties, and is not readily attacked by white ants. Useful for cabinet work, boat-building, axe and pick handles, staves for casks, and shafts of vehicles.

DEFORESTATION AT RÉUNION AND ELSEWHERE.

The ruthless cutting down of the beautiful forests, full of valuable timber, much of which was cleared by fire, has changed the face of the country. The forests, which formerly acted as sponges sending out fruitful water and humus over the lands, are now more or less cleared off. After rain, the water rushes from them in a freshet, carrying all before it, and, sweeping the denuded sides of mountains, gradually reduces them to bare rock or crumbling shale, and washes instead of fertilising the plateaux. Looking at a map of Réunion, a

stranger is immediately struck by the number of rivers indicated, and naturally concludes it to be a well-watered land. But, as a fact, nine-tenths of the rivers and streams marked are merely dry watercourses, which run only for a few hours after heavy rains. A closer examination of the lower deposits shows that many of these mountain torrents were formerly slow-moving rivers. Had not Government stepped in with a very strict forest law, and liberally restocked the forests wherever necessary, the Island of Réunion would, in the course of 100 years or so, have been as barren as the rocks of Aden or the denuded deserts of Abyssinia. It takes, however, only a few minutes to cut a tree down, but many years to bring a new one to perfection, and the mischief done will take very long to repair. The mischief is arrested, but far from completely stopped. The forest laws apply in only a very limited way to private lands, and the smaller owners, who live from hand to mouth, seek only how to make the most ready-money possible out of the forests, and think not of the future or the result to their own and their neighbours' lands. As a matter of fact, forest clearing, and especially on steep slopes, is even now carried on in far too reckless a manner.

The above remarks are taken from Consul Bennett's report on the industries of the Island of Réunion.

They apply equally to Queensland. Ever since the colony was settled, a constant warfare has been waged against the forests by the settlers. Hundreds of acres have been denuded of every scrap of timber, and have afterwards been abandoned. The most injurious clearing which can be done is that on the higher slopes of the hills. Not only does such clearing injure the settlers there themselves, but their insensate labours cause widespread trouble in the low lands. The rivers and creeks become choked with rocks, gravel, and sand carried from the denuded heights, and thus the heads of the former, which, previous to settlement and "improvement," meandered peacefully along the gullies and valleys, without even disturbing the alluvial banks, have been transformed into roaring torrents, which during heavy rains carry down vast masses of water and *débris*, overflow the neighbouring lands, destroy bridges, sweep away houses, stock, and crops, flood out mines, and do a great amount of damage, the whole of which is the result of carrying clearings up the hill sides as soon as the low lands were occupied.

There is no getting out of the truth of these statements, for it has been the bitter experience of all European, Asiatic, and American countries. Clearing the summits and higher slopes of the hills spells eventual ruin to the farmer and planter first, and to the dwellers in cities afterwards. And much of this could long ago have been prevented by adequate Forest Laws. Fortunately, the Government, with the unanimous consent of both Houses of Legislature, have determined to step in and put a stop to the iniquitous destruction of timber all over the colony. It is well known that for years men have taken up selections stocked with many kinds of valuable timber. They took these selections as homestead areas or on conditional purchases, at from 5s. to 10s. an acre, purchasing value. They at once set to work, after paying the survey fee and first, and, perhaps, second year's rent, to fell and remove all the best timber. That done, they threw up the selection, paid no more rent, and it was duly forfeited, but the selector had done a good stroke of business at the expense of the whole colony. We instanced a case a little while ago, in which a selector took up a homestead selection with the *bonâ fide* intention of cultivating the land and making a home for himself. In a deep gully he one day found three cedar trees of splendid proportions. He naturally set to work to get one of them to market. The result was a cheque for £100. The price of the selection of 160 acres was £40, and the man has yet two more trees to get out. This statement is vouched for as correct by one who visited the place and there obtained the particulars.

EXHAUSTION OF TIMBER IN SOUTH AUSTRALIA.

At a Conference of the Murray River Branches of the South Australian Bureau of Agriculture, the question of arboreal shelter was considered, and the general secretary (Mr. A. Molyneux, F.L.S.) read a paper by Mr. Walter Gill, F.L.S., conservator of forests, on "Maintenance of Efficient Shelter in some South-eastern Districts." He followed the reading with some remarks upon the effects of denudation of forest lands. Timber for fences, firewood, bridges, and many other purposes was, he said, becoming scarcer and more scarce every year, and he doubted if enough could now be obtained in the colony to replace the fences which were now very old. Professor Lourie, Mr. Quinn (horticultural instructor), and the Hon. A. W. Sandford took prominent parts in the discussion which followed.

That such a dearth of timber as is here recorded should be found in an Australian colony will surprise many whose knowledge of the outside districts is limited. Queensland still possesses large stores of valuable timber; but if crops are continually taken from the land and nothing is returned to the soil the results are ruinous to the farmer. So with our timber crops. If we annually remove many million feet of trees, and do not replace them, or, at least, take care to preserve the young stock, the inevitable result must be that we shall arrive at the end of our resources, and shall have to look abroad for supplies. But whence are those supplies to come? Other countries have been drifting towards the same end, and on all sides we hear of feverish endeavours to plant-up denuded areas and to nurse existing young forests into maturity for the benefit of future generations. Year by year we find the demand for timber increasing for railways, bridges, fencing, building, firewood, and now an enormous demand has arisen for timber to be ground up into pulp for paper-making.

In the United States (according to the *Pacific Rural Press*) the Division of Forestry has determined to make an exhaustive series of measurements and investigations for the purpose of securing accurate knowledge of the relation of forest to the run-off of streams. The question has become an exceedingly important one in many parts of the United States where lumbering is extensive, and has caused much diversity of opinion among scientific men. After examining many watersheds and securing the advice of a number of hydraulic engineers, the Division of Forestry has chosen the watershed which embraces the sources of the Mohave River, in the San Bernardino mountains, as the best centre for experiments.

The work will commence soon, and will embrace a comprehensive study of the present forest cover, considered in relation to the rainfall and the flood capacity of streams. The area selected contains three distinct types—the Holcomb shed, a brush-covered district; the Little Bear shed, which has been denuded by lumbering; and the Deep Creek shed, still covered with heavy virgin forest. These areas are under the control of the Arrowhead Irrigation Company, which has kept twenty-eight rain-gauge stations in operation for seven years, and has also measured the flow of the streams during that time, so that the Government experts will have much data already on hand. The soil is similar on all portions, and the geological formation uniformly granitic. The rainfall on the forested and logged-off tracts is practically the same, but is slightly less on the Holcomb shed, which approaches desert conditions. It is believed that conditions are so nearly similar throughout the region that the observations will be as instructive as if made on the same tract before and after lumbering. The effects of grazing and fires will also be noted.

The flood capacity of the streams will be made the basis of investigation. It is well known that, although the rainfall may be less, a barren area will often produce greater floods than a wooded area. This is because the water, unobstructed by vegetable cover, runs off the surface rapidly and is practically wasted. A lesser total rainfall, if conserved by the forest, will soak into the ground and flow steadily throughout the year. The investigations projected will

be the first, however, in this country to attempt to prove by figures that the flood extreme of streams is in proportion to the lack of forest covering. The results will be applicable in a general way to any portion of the country, and will be of special value to all regions where irrigation is practised.

Then we have the

GOVERNMENT WORK ON THE PACIFIC COAST.

The Division of Forestry will continue the investigation of Pacific coast timber begun last summer, and several parties will start in June or earlier for the redwood belt of California and the red fir forest of Washington. The object is to compare the reproduction with the present depletion, and to investigate the possibility of reforesting logged-off lands. There will be from fifteen to twenty-five men in each State. Most of the work will be done by young college men under the direction of Government forest experts.

The research will be carried on in pursuance of a system which undertakes by ascertaining the rate of growth and general life history of an existing forest to foretell the behaviour of a future one growing under like conditions. Measurements will be made and the age found of several thousand trees in the logging districts, and large tracts will be cruised and surveyed to find the stand of timber in varying situations. By measuring and counting the annual rings of a tree at several sections, an expert can determine not only its age but at what stage it grew fastest, when it reached maturity, and the exact amount of wood added during any period. By obtaining these figures for large areas it will be possible to compute the time necessary to raise successive crops in the Pacific timber region.

This work will be especially valuable to owners of timber lands who are in doubt as to the profit of paying taxes on their property after it has been logged.

Assistance to Forest Owners.—The offer to give advice and furnish working plans to persons desirous to plant forest trees, made by the Division of Forestry, has received immediate response from farmers in every part of the country. Although but a few months have elapsed since the offer became generally known, 118 applications have been received, and plans for thirty-eight of these will be completed before the time for spring planting to begin. A still larger number have asked for written advice, which does not require field inspection by the forest officials. The treeless States have been quickest to avail themselves of assistance, the number of applications being as follows:—Kansas, 38; Oklahoma, 19; Nebraska, 12; North Dakota, 9; Iowa, 6; Indiana, 5; Texas, 5; Minnesota, 4; Colorado, 3; Washington, 3; South Dakota, 2; California, 2; Illinois, 2; New York, 2; Ohio, 1; Missouri, 1; Delaware, 1.

The majority of plans are for tracts of five to ten acres, intended by prairie farmers to afford windbreaks and fuel supplies. A few plantings of 1,000 and 2,000 acres are being made as experiments in raising forest crops for market in regions where such material is scarce. After considering these applications in order, the Division of Forestry has sent experts to study the conditions of as many as possible of localities which offered the best opportunities for object lessons to the public. Plans will be sent without delay to each owner, instructing him in detail how to plant, and recommending the best species adapted to his tract.

Much attention is being given at present to timber lands. Lumber companies are paying good prices for stumpage, and a large amount of capital is looking for good timber within reasonable haulage distances. Timber claims are being hunted up in Oregon and Washington particularly, and many mineral prospectors have utilised their time during the snowy months of the winter in a search for good timber.

Thus it will be seen that the people of the United States have taken the alarm; but they have risen to the occasion, and the Government has taken prompt steps to repair the heavy losses which the country has sustained by reckless destruction of forest trees.

Science.

SOME QUEENSLAND SOILS.

By J. C. BRÜNNICH, F.C.S.,
Chemist to the Department of Agriculture.

For the information of the managers of the various State farms complete analyses of their most important soils were carried out at the Laboratory of the Department of Agriculture; and, as these soils come from various districts in Queensland, they will be found of general interest, and are given now in tabulated form.

The soils were all prepared and analysed in exactly the same manner, to obtain strictly comparable results; and in all cases mechanical analysis and so-called agricultural analysis (extracting the soil with boiling hydrochloric acid of certain strength) were carried out.

In order to enable some of our farmers to interpret these analyses, I will now give a short explanation of the various figures given.

Once for all, it must be understood that the agricultural analysis does not give the total amounts of plant foods present in the soils; only a so-called absolute analysis will give the actual amount of every chemical compound. For instance, the portion of soil (No. 7) which amounted to 63·469 per cent., and which was insoluble in boiling hydrochloric acid was by further treatment—firstly, with strong sulphuric acid; and secondly, with hydrofluoric acid—made soluble, and found to contain considerable amounts of the plant foods—lime and potash—which, however, are in such an insoluble form that they are not directly available for the plants. Even the whole of the amounts of phosphoric acid, lime, and potash, given by the extraction of hydrochloric acid, are not by any means in a readily assimilable form, and for this reason—by many authorities, the value of agricultural analysis of soils is completely denied, and methods are tried to be found which should give the exact amounts of mineral matter made soluble by the action of roots on the soil. The solutions of various weak acids have been used for this purpose; and Dr. Maxwell has discovered a method suitable for the volcanic soils of the Hawaiian Islands. He uses a 1-per-cent. solution of aspartic acid, and finds that by acting twenty-four hours on Hawaiian soils the same amounts of lime, potash, and phosphoric acid are removed as by the production ten crops of cane ("Lavas and Soils of the Hawaiian Islands," by Dr. Maxwell; page 181). It seems, however, that this method is not applicable to every kind of soil, and, I presume, not for every kind of crop; but new methods have to be worked out for the varying conditions, which involve an enormous amount of most careful investigations. For this reason, we have to be satisfied with the agricultural analysis, and, if carried out exactly alike and in connection with mechanical analysis, their value for the farmer cannot be denied, as it is quite evident that, if the analysis shows a great deficiency in either nitrogen, potash, lime, or phosphoric acid, they must be applied by artificial manuring. But here, again, rule of thumb is not sufficient, and because, for instance, nitrogen is wanted, it would not do in all cases to green manure the ground, or to apply nitrogen in the form of sulphate of ammonia, or again in the form of nitrate of soda. The nitrogen is generally given in either of these three forms, but which one to use depends entirely on the nature of the soil, on the climate, and on the crop to be grown. Heavy soils inclined to be wet might be completely ruined for a time by heavy green manuring, as the ploughing under of a lot of green stuff inclines to sour the soil; and this is only remedied by a heavy dressing of quicklime. For this reason, it is very important that the samples of the soil should be taken by competent persons—if possible, by the analyst himself—and all particulars about the peculiarities of the land itself, climate, crops, &c., be carefully noted and reported.

The samples of the soil received for analysis are now left for about ten to fourteen days in a shady, dry place, assisting the process of drying by breaking up the lumps. The soil is broken up with a wooden mallet, and the stones, gravel, and sand separated out by passing weighed portions through sieves with 25, 144, and 576 meshes per square inch. The lumps remaining on the sieves are gently broken up, and the stones cleaned from adhering soil by washing; the three sieves separating the raw soil into stones, gravel, sand, and fine earth. The air-dried fine earth passing through the finest sieve serves for the chemical analysis, but is also again, by washing with a stream of water of certain velocity (elutriation), mechanically divided into fine sand and clay. Other important properties of the fine soil are also determined; the most important are:—

Reaction.—With the help of chemical tests, it is found if the soil has an alkaline, neutral, or acid character. Acidity is generally a bad sign, showing the soil to be so dense that the air cannot enter sufficiently to help in the process of decomposition of decaying vegetable matter.

Weight of Soil per acre, to a depth of 6 inches, gives the actual weight of the fine earth in tons per acre for a depth of 6 inches. Soils rich in organic matters (humus)—as, for instance, the Redland Bay soils—are light; whereas soils poor in humus—as, for instance, samples No. 9 and 10 from Gindie, and Nos. 35 and 37 from the College hill—are very heavy.

Capacity for Water.—Weighed quantities of the soils are completely saturated with water, and by another weighing it is ascertained how much water the soil is thus capable of absorbing. Soils rich in humus and clayey soils absorb larger amounts of water. Samples Nos. 3, 4, 11, and 12 have a high capacity for water; samples Nos. 9, 10, and 37, a very low one. The application of this value to the actual weight of soil per acre gives the weight of water absorbed in tons per acre 6 inches deep.

Capillary power is of great importance, indicating the mechanical condition of the soil, and also, indirectly, its composition. Soil rich in humus and also fine sand will have a higher capillarity than very clayey soil. The capillarity is ascertained by filling glass tubes with the fine earth, both ends being open and the lower end closed with a piece of fine linen, and dipping in water After a certain time (in our case six, twelve, twenty-four, thirty-six, and sixty hours), the height of the water in the tubes is measured. Amongst the analyses shown, we find that the volcanic red soil of Redland Bay possesses a very high porosity and capillary power, the water rising after the first six hours already over 10 inches; such soil will always be well drained, and even in the wettest weather will never become water-logged. Another sample of soil from the Hermitage State Farm (Nos. 3 and 4) has no porosity, and very low capillary power; even after sixty hours the water having risen only ½-inch. This soil is exceptionally wet, and, although it analyses well, it will grow no crops on account of its poor physical condition. We also see that, amongst all the soils given, these two are the only ones with an acid reaction.

Absorptive Power for Salts of a soil is of great practical importance. It indicates the power the soil possesses of retaining certain chemical compounds. Soils have not only the power of absorbing various gases, but also withdraw certain substances from watery solutions. A great absorptive power is always a favourable sign of fertility, and it has a great importance for the practical agriculturist, as it prevents waste of valuable food stuffs, formed by decomposition of organic matter, added to the soil by the rain water or applied in the form of farmyard or artificial manures.

The power of absorption of soils varies for different substances, but, for practical purposes, it is sufficient to ascertain how much nitrogen is absorbed out of dilute solutions containing ammonia (ammonium chloride); and in our analyses we state how many cubic centimetres (c.c.) (16½ c.c. equal 1 cubic inch) of nitrogen are absorbed by a certain quantity of soil. Subsoil No. 14 has a very high absorptive power, equal to 300 c.c.; whereas soils Nos. 35 to 37 have hardly any absorptive power at all.

For the *chemical analysis*, the air-dried fine earth is used, and at first the moisture, still retained by the soil, and given off by drying for several hours at 212 degrees Fahr., is determined. Here, again, we find a considerable difference, some of the soils containing still over 10 per cent. of moisture (Nos 1, 3, 4, 11 to 14, &c.), and others less than 1 per cent. (Nos. 9 and 35).

The water contained in soil, besides moisture, is called combined water, and is chemically bound to some of the mineral substances, and only driven off at high temperatures. The quantity of *humus* is determined by direct determination of the amount of carbonic acid produced by moist combustion of the organic matters in the soil with the help of a strongly oxidising agent (bichromate of potash and sulphuric acid), and multiplying the result by ·471.

Another important constituent of the soils—the nitrogen—is given in percentage of total nitrogen, directly determined by Kjeldahl's method.

For the determination of the mineral matters, a weighed quantity of the soil is boiled for two hours with hydrochloric acid of 1·1 specific gravity; the insoluble matter, after drying and burning, is weighed as insoluble in HCl; and in the solution, in aliquot parts, the other important constituents of plant food—phosphoric acid, lime, potash—are determined.

Having given a short description of the methods employed in the analysis of soils, we will now study the results of some of the analyses given:—

Taking, first, the soils of the *Hermitage State Farm*, near Warwick, which are alluvial soils, of partly volcanic origin, all the creeks being surrounded by basaltic country, we find them, on the whole, excellent agricultural lands, with good physical conditions, and containing an ample amount of plant foods. The subsoils Nos. 6 and 8 are rather heavy (low capillarity), and would be improved by subsoiling or drainage. The sample of soil and subsoil (Nos. 3 and 4) from a so-called salty patch owes its sterility to poor physical condition (very low capillarity) and too high an amount of chlorine contained in both soil and subsoil.

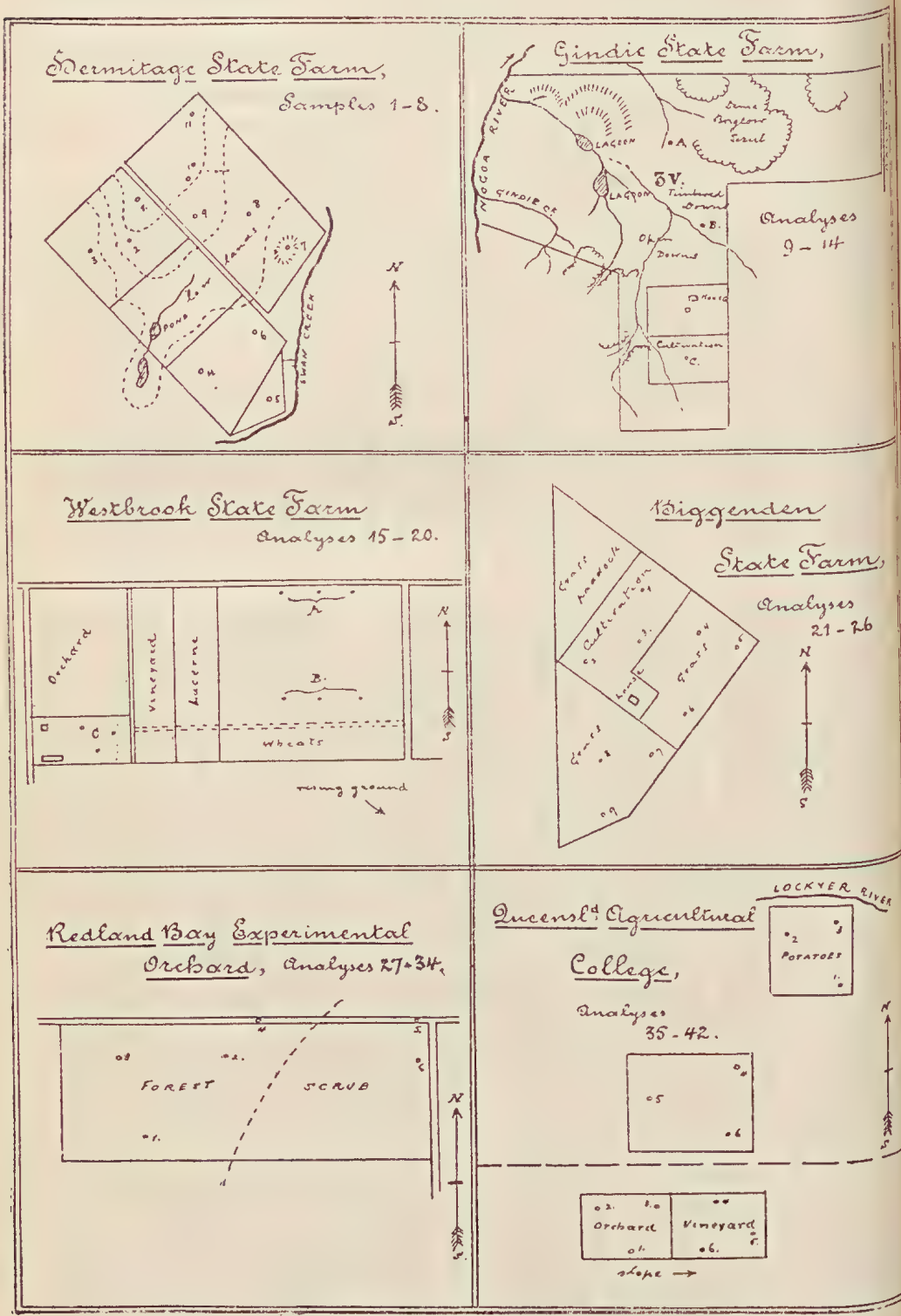
The samples of soils and subsoils from the *Gindie State Farm* show a very great variation, according to the locality, where the samples were taken. The soil No. 9, with the subsoil No. 10, although rather poor in humus, nitrogen, lime, and potash, is, on account of its good physical condition, eminently suitable for an orchard or vineyard. The soils Nos. 11 and 13 are good agricultural land, high in plant foods, except nitrogen. The physical condition is not too good, the lands are inclined to be slushy when wet, and would be improved by deep cultivation, sub-drainage, and green manuring.

The soils from the *Westbrook State Farm* are of distinctly volcanic origin, and continually improved by the decomposition of the volcanic tufa and basaltic stones found in the subsoil, and of which a separate absolute analysis is given. To show how only parts of the mineral matters are soluble in hydrochloric acid, the finely powdered tufa and basalt were also treated exactly like soils, and the result recorded in the second column. The analyses of soil and subsoil of samples Nos. 17 and 18 indicate an exceptionally good agricultural land.

The samples of soil from *Biggenden State Farm* show again a very great difference. The soil of the cultivation paddock (sample No. 21) is good agricultural land, very rich in humus, fair in nitrogen and phosphoric acid, poor in potash, and containing hardly sufficient lime for the high percentage of magnesia. The soil of the grazing paddock (sample No. 23) is poor in everything except potash.

The soils and subsoils from *Redland Bay* represent a large portion of our districts with red volcanic soils. The soils are exceedingly deep and extremely porous. They are rather poor in phosphoric acid and lime. The humus, principally in the sample of virgin scrub soil, is very high, being the highest of all the analyses given. The difference between soil and subsoil is, as might be expected, very slight, as no distinct line of demarcation between soil and subsoil can be detected. In such cases, it is quite sufficient to take the sample of soil alone for a depth of about 12 inches to be analysed.

The samples of soil from the *Agricultural College*, taken on the flats (Nos. 35-42), represent the rich agricultural land found in the alluvial plains of the Lockyer district. The soil is of very good physical condition and rich in plant foods, and of great depth; the difference between soil and subsoil again being very slight.



PLANS OF STATE FARMS ILLUSTRATING ANALYSIS TABLES.

Field or blo samples of	Samples taken from holes Nos. 1, 2, and 10	Samples taken from holes Nos. 3, 4, 5, 6, 9, 11.
GENERAL D		
Quality	This land was under cultivation many years back, but was broken up again about three years ago, crops of wheat, barley, and in some places cow peas have been grown.	
How lo	No manures have ever been applied.	
What c		
Is land	Fairly dry.	
Is land	Having a natural drainage towards the middle.	
Is land	Sloping slightly.	
Descrip		
Sur	Sandy, brown soil	Rich, black, clayey soil.
Int		
Sub	Heavy brown clay	Heavy black clay.

T	Soil 5.		Subsoil 6.		Soil 7.		Subsoil 8.	
PROPERTIES								
Reactio	Neutral.	...	Neutral.	...	Neutral.	...	Neutral.	
Weight	795	...	801	...	760	...	801	
Capaci	42·7	...	46·2	...	49·6	...	50·6	
Absorbe	339	...	370	...	377	...	405	
Capillar	6, 9, 12, 14, 15½	...	¾, 1, 1½, 2, 2½	...	5, 8, 11, 13, 15	...	1, 1¼, 1½, 1½, 2	
Absorp	110	...	190	...	224	...	240	
MECHANICA								
Stones	·33	..	·90	...	·20	...	·37	
Gravel	·74	...	2·33	...	·13	...	·13	
Sand	·75	...	1·73	...	·17	...	·63	
Fine sa	45·64		23·82		24·07		12·70	
Clay	41·39	*780*	59·53	*761*	58·03	*756*	69·87	*792*
Organic	11·15		11·69		79·40		16·30	
Vegeta	...	...	...	...	(17·40)			
CHEMICAL A								
Moistu	5·033	...	7·120	...	9·343	...	9·733	
Humus	2·562	*20·0*	1·683	*12·8*	3·810	*28·8*	2·374	*18·8*
Combi	3·759	...	3·497	...	4·345	...	4·376	
Chlorin	·004	...	·010	...	·004	...	·025	
Carbon	·560	...	1·260	...	·260	...	·400	
Total n	·14	*1·1*	·105	*·8*	·154	*1·2*	·104	*·8*
Soluble								
Sol	·097	...	·103	...	·157	...	·219	
Su	·094	...	·112	...	·091	...	·086	
Ph	·128	*1·0*	·068	*·5*	5·232	*1·8*	·222	*1·8*
Iro	3·001	...	3·018	...	5·970	...	7·200	
Al	6·977	...	8·882	...	9·318	...	9·788	
Li	1·025	*8·0*	1·832	*13·9*	2·160	*16·3*	1·358	*10·8*
Ma	·503	*3·9*	·805	*6·1*	1·140	*8·6*	1·671	*13·2*
Po	·223	*1·7*	·252	*1·9*	·312	*2·4*	·252	*2·0*
So	·096	*·7*	·120	*·9*	·094	*·7*	·145	*1·1*
Insolul	76·515	...	71·799	...	63·469*	...	61·639	
	100·577	...	100·561	...	100·705	...	99·488	

RE

... = 6·350
... = ·280
... = 3·250
... = ·810

... ... 4·800
... ... 27·480
... ... 1·390
... ... 15·158

62·764

... ... [63·469]

"HERMITAGE" STATE FARM, NEAR WARWICK.

DESCRIPTION AND ANALYSIS OF SOILS.

Field or block and description of the places on the field where the samples of soil were taken	Sample taken on a knoll, from hole No. 7	Samples taken from hole No. 8, a low-lying patch of locally called "salt land"	Samples taken from holes Nos. 1, 2, and 10	Samples taken from holes Nos. 3, 4, 5, 6, 9, 11.
GENERAL DESCRIPTION AND PROPERTIES—				
Quality of land according to the crops obtained	Good land...	Poor	This land was under cultivation many years back, but was broken up again about three years ago, crops of wheat, barley, and in some places cow peas have been grown.	
How long was land under crop?	...	No crops do well...	No manures have ever been applied.	
What crops have been grown?				
Is land wet or dry?	Dry	Wet	Fairly dry.	
Is land drained or not?	Natural drainage	...	Having a natural drainage towards the middle.	
Is land low-lying or elevated?	High	Low lying...	Sloping slightly.	
Description of the various layers—				
Surface soil	Brown clayey soil	Heavy black clayey soil	Sandy, brown soil	Rich, black, clayey soil.
Intermed. layer				
Subsoil	Stony brown clay	Heavy black clay	Heavy brown clay	Heavy black clay.

The Analysis refers to	Soil 1.		Subsoil 2.		Soil 3.		Subsoil 4.		Soil 5.		Subsoil 6.		Soil 7.		Subsoil 8.	
PROPERTIES OF THE SOIL—																
Reaction	Neutral.		Neutral.		Acid.		Acid.		Neutral.		Neutral.		Neutral.		Neutral.	
Weight of soil per acre, 6 in. deep ... tons	761	*tons per acre to 6 in. depth.*	801	*tons per acre 6 in. deep.*	807		764		795		801		760		801	
Capacity for water ... %	43·2		37·1		61·6		85·7		42·7		46·2		49·6		50·6	
Absorbed weight per acre, 6 in. deep ... tons	329		297		497		655		339		370		377		405	
Capillary power, inches of water after 6, 12, 24, 36, and 60 hours	3¼, 4¾, 5¾, 6½, 8½		3¾, 6¼, 7, 8, 11		0, 0, ¼, ½, ½		0, 0, ¼, ¼, ½		6, 9, 12, 14, 15½		¾, 1, 1½, 2, 2½		5, 8, 11, 13, 15		1, 1¾, 1½, 1½, 2	
Absorptive powers for salts ... c.c. of nitrogen	166		178		150		252		140		190		224		240	
MECHANICAL ANALYSIS OF THE SOIL—																
Stones over 5 mm. diameter ... %	·60		3·83		·03		1·23		·33		·90		·20		·37	
Gravel over 2 mm. diameter ... ,,	1·00		3·25		·03		·53		·74		2·33		·13		·13	
Sand ... ,,	1·74		3·25		·60		·40		·75		1·73		·17		·63	
Fine sand ... ,,	19·30		20·19		21·42		15·25		45·64		23·82		21·07		12·70	
Clay ... ,, (Fine earth)	58·22	*736*	54·07	*718*	63·68	*802*	65·69	*748*	41·39	*780*	59·53	*761*	58·03	*756*	69·87	*792*
Organic matter and moisture ,,	19·14		15·41		14·24		16·98		11·15		11·69		79·40		16·30	
Vegetable fibres and roots ... ,,	...	...	...	...	...	...	...	...	...	...	...	...	(17·40)			
CHEMICAL ANALYSIS OF THE SOIL (Fine Earth)—																
Moisture ... ,,	10·566	...	9·813	..	10·666	...	10·600	...	5·033	...	7·120	...	9·343	...	9·733	
Humus ... ,,	2·411	*17·7*	1 450	*10·4*	2·402	*19·3*	1·734	*13·0*	2·562	*20·0*	1·683	*12·8*	3·810	*28·8*	2·374	*18·8*
Combin. water ... ,,	6·838	...	5·927	...	1·257	...	5·016	...	3·759	...	3·497	...	4·345	...	4·376	
Chlorine ... Cl ,,	·002	...	·003	...	·047	...	·063	...	·004	...	·010	...	·004	...	·025	
Carbonic acid ... CO_2 ,,	2·260	...	2·080	...	·900	...	2·060	...	·560	...	1·260	...	·260	...	·400	
Total nitrogen ... N ,,	·21	*1·5*	·19	*1·4*	·224	*1·8*	·14	*1·0*	·14	*1·1*	·105	*·8*	·154	*1·2*	·104	*·8*
Soluble in HCl of 1·1 sp. gr., boiled for two hours—																
Sol. silicia ... SiO_2 ,,	·305	...	·270	...	·394	...	·369	...	·097	...	·103	...	·157	...	·219	
Sulphuric acid ... SO_3 ,,	·127	...	·122	...	·135	...	·120	...	·094	...	·112	...	·091	...	·086	
Phosphoric acid ... P_2O_5 ,,	·209	*1·5*	·222	*1·6*	·111	*·9*	·095	*·7*	·128	*1·0*	·068	*·5*	5·232	*1·8*	·222	*1·8*
Iron ... Fe_2O_3 ,,	8·200	...	8·240	...	6·400	...	7·200	...	3·001	...	3·018	...	5·970	...	7·200	
Alumina ... Al_2O_3 ,,	12·076	...	10·263	...	8·189	...	10·505	...	6·977	...	8·882	...	9·318	...	9·788	
Lime ... CaO ,,	3·560	*26·2*	3·540	*25·4*	·812	*6·5*	2·650	*19·8*	1·025	*8·0*	1·832	*13·9*	2·160	*16·3*	1·358	*10·8*
Magnesia ... MgO ,,	1·076	*7·9*	1·963	*14·1*	1·465	*11·8*	1·510	*11·3*	·503	*3·9*	·805	*6·1*	1·140	*8·6*	1·671	*13·2*
Potash ... K_2O ,,	·242	*1·8*	·251	*1·8*	·282	*2·3*	·310	*2·3*	·223	*1·7*	·252	*1·9*	·312	*2·4*	·252	*2·0*
Soda ... Na_2O ,,	·190	*1·4*	·195	*1·4*	·057	*·4*	·150	*1·1*	·096	*·7*	·120	*·9*	·094	*·7*	·145	*1·1*
Insoluble in HCl of 1·1 sp. gr. ... ,,	52·095	...	56·390	...	67·835	...	57·890	...	76·515	...	71·799	...	63·469*	...	61·639	
TOTAL ... ,,	100·157	...	100·729	...	100·949	...	100·272	...	100·577	...	100·561	...	100·705	...	99·488	

REMARKS:—All the soils and sub soils (with exception of samples from hole No. 8 contains nodules of limestone ($CaCO_3$).

The insoluble portion* of soil No. 7 is composed as follows:—

Soluble in H_2SO_4:		
SiO_2	=	11·057
Al_2O_3	=	1·405
Fe_2O_3	=	1·053
CaO	=	·052
MgO	=	·189
K_2O	=	·065
Na_2O	=	·115
Clay ,,		13·936

Soluble in HF:		
Al_2O_3	=	6·350
CaO	=	·280
Na_2O	=	3·250
K_2O	=	·810
Corresponding to—		
Potash Feldspar		4·800
Soda ,,		27·480
Lime ,,		1·390
Leaving as pure quartz sand		15·158
		62·764
In soil		[63·469]

GINDIE STATE FARM.

DESCRIPTION AND ANALYSIS OF SOILS

Field or block and description of the places on the field where the samples of soil were taken	Sample taken in grass paddock; from hole A		Sample from grass paddock on timbered downs; from hole B		Sample taken from cultivation paddock; from hole C	
GENERAL DESCRIPTION AND PROPERTIES—						
Quality of land according to the crops obtained	Virgin forest, well timbered with bloodwood, ironbark, quinine, &c.		Heavily timbered downs, with briglow, emu-bush, fuchsia, coolibah, &c.		Volcanic forest land	
How long was land under crop?	Fair crop of grass, mostly speargrass		Spare crop of grass		For about two years.	
What crops have been grown?	None				One good crop of maize and wheat, onions, Swedes, &c., afterwards.	
Is land wet or dry?	Dry		Soil very heavy at first, but gets lighter when worked		Dry.	
Is land drained or not?	Surface drainage towards gully		Surface drainage towards gully		Natural drainage.	
Is land low-lying or elevated?						
Description of the various layers—						
Surface soil	Chocolate, sandy soil, gradually changing into		Heavy black soil, changing into		Black volcanic soil changing into	
Intermed. layer						
Subsoil	Reddish sandy subsoil		Black clayey subsoil, containing small water-worn stones		Dark clayey subsoil, and at depth of 2 feet 6 inches to 3 feet 6 inches rotten basaltic stones.	
The Analysis refers to	Soil 9.	Subsoil 10.	Soil 11.	Subsoil 12.	Soil 13.	Subsoil 14.
PROPERTIES OF THE SOIL—						
Reaction	Neutral.	Neutral.	Neutral.	Neutral.	Neutral.	Neutral.
Weight of soil per acre, 6 in. deep... tons	959	922	722	716	740	752
Capacity for water %	20·8	23·6	68·0	64·4	62·0	58·0
Absorbed weight per acre, 6 in. deep tons	199	217·7	491	461	459	436
Capillary power, inches of water after 6, 12, 24, 36 and 60 hours	10, 12, 13¾, 14½, 15¼	10, 12¾, 13½, 14¾, 15	5, 6¾, 7½, 9, 11	5½, 7, 8, 9¾, 10	7, 10, 11, 13½, 16	3, 3¾, 4, 5¾, 6
Absorptive powers for salts c.c. of nitrog.	20	28	289	276	290	360
	Tons per acre, 6 in. deep.	*Tons per acre, 6 in. deep.*				
MECHANICAL ANALYSIS OF THE SOIL—						
Stones over 5 mm. diameter %	2·47	·20	·20	·41	·80	·33
Gravel over 2 mm. diameter "	7·83	3·70	·20	·13	1·00	1·26
Sand "	9·07	14·77	·23	·80	1·40	1·40
Fine sand "	70·64	66·06	8·36	6·43	6·73	7·28
Clay "	8·22	13·13	70·13	71·41	72·03	71·78
Organic matter and moisture "	1·77	2·14	20·88	20·82	18·04	17·95
Fine earth	*773*	*750*	*717*	*707*	*716*	*740*
Vegetable fibres and roots						
CHEMICAL ANALYSIS OF THE SOIL (Fine Earth)—						
Moisture %	·540	1·040	10·330	11·010	10·590	10·350
Humus "	·600	·380	2·646	2·300	2·600	1·554
Combin. water "	1·050	1·270	8·044	7·780	5·450	6·596
	4·6	*2·9*	*19·0*	*16·3*	*18·6*	*11·3*
Chlorine Cl "	·0005	·0005	·001	·001	·001	·001
Carbonic acid CO_2 "	·010	·010	·610	1·200	·230	·260
Total nitrogen N "	·016	trace	·076	·070	·046	·044
	1		*·5*	*·5*	*·3*	*·3*
Soluble in HCl of 1·1 sp. gr. boiled for two hours—						
Sol. silica SiO_2 "	·199	·206	·482	·356	·380	·220
Sulphuric acid SO_3 "	·010	·034	·017	·020	·027	·010
Phosphoric acid P_2O_5 "	·061	·063	·257	·245	·226	·232
	·5	*·5*	*1·8*	*1·7*	*1·6*	*1·7*
Iron Fe_2O_5 "	2·514	3·200	11·360*	11·054*	10·400*	11·200*
Alumina Al_2O_3 "	1·020	1·821	12·313	12·111	10·140	9·368
Lime CaO "	·095	·128	2·833	3·228	2·005	2·180
	·7	*1·0*	*20·3*	*22·8*	*14·3*	*15·9*
Magnesia MgO "	·050	·086	1·212	1·606	1·808	1·847
Potash K_2O "	·034	·031	·287	·287	·194	·286
Soda Na_2O "	·010	·010	·004	·003	·003	·006
	·4 *·2* *·1*	*·6* *·2* *·1*	*8·7* *2·1* *·0*	*11·4* *2·0* *·0*	*12·9* *1·4* *·0*	*13·5* *2·1* *·0*
Insoluble in HCl of 1·1 sp. gr. "	93·750	90·980	49·170	47·986	55·384	55·474
TOTAL "	99·9435	99·2595	99·566	99·187	99·438	99·584

* The iron of these soils is partly in form of black magnetic oxide (Fe_3O_4).

Field or in grass paddock on timbered were taken from hole B	Sample taken from cultivation paddock ; from hole C
GENERAL	
Qualbered downs, with briglow, emusia, coolibah, &c.	Volcanic forest land
Howf grass	For about two years.
Wha ...	One good crop of maize and wheat, onions, Swedes, &c., afterwards.
Is lavvy at first, but gets lighter when	Dry.
Is lanage towards	Natural drainage.
Is la	
Desc	
x soil,	Black volcanic soil
g into	changing into
y subsoil, containing small water-	Dark clayey subsoil, and at depth of 2 feet 6 inches to 3 feet 6 inches rotten basaltic
es	stones.

	11.	Subsoil 12.		Soil 13.		Subsoil 14.	
PROPERT							
Rea	...	Neutral.	...	Neutral.	...	Neutral.	
Wei	...	716	...	740	...	752	
Cap	...	64·4	...	62·0	...	58·0	
Abs	...	461	...	459	...	436	
Cap	...	$5\frac{1}{2}$, 7, 8, $9\frac{3}{4}$, 10	...	7, 10, 11, $13\frac{1}{2}$, 16	...	3, $3\frac{3}{4}$, 4, $5\frac{3}{4}$, 6	
Abs	...	276	...	290	...	300	
MECHAN							
Stor	...	·41	...	·80	...	·33	
Gra	...	·13	...	1·00	...	1·26	
San	...	·80	...	1·40	...	1·40	
Fin	717	6·43	707	6·73	716	7·28	730
Cla		71·41		72·03		71·78	
Org		20·82		18·04		17·95	
Veg	...	...	...	...	...	...	...
CHEMICA							
Moi	...	11·010	...	10·590	...	10·350	
Hu	19·0	2·300	16·3	2·600	18·6	1·554	11·3
Con	...	7·780	...	5·450	...	6·596	
Chl	...	·001	...	·001	...	·001	
Car	...	1·200	...	·230	...	·260	
Tot	·5	·070	·5	·046	·3	·044	·3
Solu							
	...	·356	...	·380	...	·220	
	...	·020	...	·027	...	·010	
	1·8	·245	1·7	·226	1·6	·232	1·7
*	...	11·054*	...	10·400*	...	11·200*	
	...	12·111	...	10·140	...	9 368	
	20 3	3·228	22·8	2·005	14·3	2·180	15·9
	8·7	1·606	11·4	1·808	12·9	1·847	13·5
	2·1	·287	2·0	·194	1·4	·286	2·1
	·0	·003	·0	·003	·0	·006	·0
Ins	...	47·986	...	55·384	...	55·474	
	...	99·187	...	99·438	...	99·584	

Field or e taken from paddock near wher les, 3 holes marked C

GENERA
Qua open forest.

Hov
rops have been grown.
Wh
Is l
Is l slope to W.
Is l st ground.
Des
volcanic soil.

loamy subsoil, containing loose ltic stones, and at a depth of 1 in. to 4 ft. in patches a softer ble volcanic rock.

	oil 19.		Subsoil 20.	
PROPERT				
Rea	ral.	..	Neutral.	
Wet	776	...	783	
Cap	59·3	...	54·3	
Abs	460	...	425	
Cap	3, 9	...	5½, 7, 9, 10½, 12	
Abs	236	...	252	
MECHAN				
Stor	·30			
Gra	·15	...	·30	
San	·10	...	·10	
Fin	6·01		12·30	
Cla	4·95	772	72·06	780
Org	8·49		15 24	
Veg.		...	...	
CHEMICA				
Moi	620	...	5·660	
Hur	697	28·5	1·674	13·1
Com	278	...	7·976	
Chl	001	...	·001	
Carl	270	...	·040	
Tot		1·1	·053	·4
Solu				
	·652	...	·526	
	·001	...	trace	
	·232	1·8	·234	1·8
	·200*	...	11·120*	
	·488	...	14·706	
	·063	8·2	1·131	8·8
	·330	10 3	1·527	11·9
	·184	1·4	·368	2·9
	·015	·1	·011	·1
Insc	636	...	54 544	
	·667	...	99·518	

Absolute Analysis of—

—	Volcanic Tufa, found near A.		Basaltic Stones, found near B & C.	
		Soluble in boiling HCl of 1·1 sp. gr.		Soluble in boiling HCl of 1·1 sp. gr.
Moist.	6·320		·820	
Comb. water	5 500		2·180	
Sol. SiO_2	31·493	·92	19·388	·40
SO_3				
P_2O_5	·627	·54	·760	·60
Fe_2O_3	13·332	12 00	11·654	9·82
Al_2O_3	16 926	8·86	20·495	7·50
CaO	2·941	1 95	9·314	3·44
MgO	2 761	2·39	6·846	3·82
K_2O	2·243	·04	·473	·16
Na_2O	·621	·02	·330	·02
Insol fr. diff.	17·236	...	27·740	
	100·000	...	100·000	

$_4$).

WESTBROOK STATE FARM.

Description and Analysis of Soils.

Field or block, and description of the places on the field where the samples of soil were taken	Cultivation paddock, samples taken from 3 holes marked A near the road	Cultivation paddock, samples taken on higher ground from 3 holes marked B	Sample taken from paddock near stables, 3 holes marked C
General Description and Properties—			
Quality of land according to the crops obtained	Open forest with gum topped box, Moreton Bay ash, &c.	Open forest, like A	Virgin open forest.
How long was land under crop?	In '97 wheat, '98 cowpeas and wheat	'97 amber cane (light crop) '98 maize (heavy crop) '99 in prepar. for cowpea	No crops have been grown.
What crops have been grown?	In '99 vacant	Dry.	
Is land wet or dry?	Dry	Slight slope from S. to N.	Slight slope to W.
Is land drained or not?	Slight fall towards N. (2 ft. per chain)		Highest ground.
Is land low-lying or elevated?			
Description of the various layers—			
Surface soil	Dark chocolate volcanic soil, gradually changing into	Dark chocolate volcanic soil, changing into	Black volcanic soil.
Intermed. layer			
Subsoil	Dark loamy subsoil, containing, at a depth of 2 ft. 6 in. to 4 ft., a friable easily decomposed volcanic tufa	Sandy loamy subsoil, containing a large amount of loose basaltic stones, in some places very stony	Sandy loamy subsoil, containing loose basaltic stones, and at a depth of 1 ft. 6 in. to 4 ft. in patches a softer friable volcanic rock.

The Analysis refers to	Soil 15.		Subsoil 16		Soil 17.		Subsoil 18.		Soil 19.		Subsoil 20.	
Properties of the Soil—												
Reaction	Neutral.	..	Neutral.	..	Neutral.	..	Neutral.	..	Neutral.	..	Neutral.	
Weight of soil per acre, 6 in. deep ... tons	740	...	722	...	807	...	789	...	776	...	783	
Capacity for water ... %	49·1	...	55·4	...	48·8	...	46·1	...	59·3	...	54·3	
Absorbed weight per acre, 6 in. deep ... tons	363	...	400	...	393	...	363	...	460	...	425	
Capillary power, inches of water after 6, 12, 24, 36, and 60 hours	7, 10, 12, 15, 16½	...	6½, 9, 11½, 14½, 16	...	5¾, 7¾, 10, 12, 14	...	10, 13½, 17, 21, 23	...	4, 5, 7, 8, 9	...	5½, 7, 9, 10½, 12	
Absorptive powers for salts ... c.c. of nitrogen	180	...	220	...	216	...	244	...	236	...	252	
Mechanical Analysis of the Soil—												
Stones over 5 mm. diameter %	...	...	1·30	...	...	...	...	...	·30			
Gravel over 2 mm diameter ,,	...	...	·70	...	...	...	1·40	...	·15	...	·30	
Sand ,,	...	...	·30	...	...	...	7·00	...	·10	...	·10	
Fine sand ,,	8·03	7·9	11·59	7·06	19·88	8·07	13·53	7·23	6·01	7·72	12·30	7·80
Clay ,,	75·61		68·49		64·90		67·55		74·95		72·06	
Organic matter and moisture ,,	16·36		17·62		15·22		10·52		18·49		15·24	
Vegetables fibres and roots ...	...	...	...	...	...	...	...	...	...	...	...	
Chemical Analysis of the Soil (Fine Earth)—												
Moisture ,,	2·890	2·97	5·120	9·1	3·480	20·5	3·560	9·3	5·620	28·5	5·660	13·1
Humus ,,	4·022		1·286		2·542		1·290		3·697		1·674	
Combin. water ,,	9·248		11·614		9·199		6·640		9·278		7·976	
Chlorine Cl ,,	·001	·10	·001	·6	·001	1·0	·001	·3	·001	1·1	·001	·4
Carbonic acid CO_2 ,,	·200		·070		·130		·130		·270		·040	
Total nitrogen N ,,	·140		·084		·126		·042		·146		·053	
Soluble in HCl of 1·1 sp. gr., boiled for two hours—												
Sol. silica SiO_2 ,,	·494	·8	·440	1·1	·516	2·3	·476	2·6	·652	1·8	·526	1·8
Sulphuric acid SO_3 ,,	·003		·006		·001		trace		·001		trace	
Phosphoric acid P_2O_5 ,,	·105		·153		·281		·363		·232		·234	
Iron Fe_2O_3 ,,	15·714*	3·2	14·145*	2·8	9·211*	9·5	9·428*	11·2	11·200*	8·2	11·120*	8·8
Alumina Al_2O_3 ,,	12·183		18·842		12·959		14·711		15·488		14·706	
Lime CaO ,,	·436		·402		1·175		1·544		1·063		1·131	
Magnesia MgO ,,	·471	1·7	·637	1·7	1·239	2·1	1·520	1·3	1·330	1·4	1·527	2·9
Potash K_2O ,,	·223		·242		·209		·186		·184		·368	
Soda Na_2O ,,	·013	·1	·022	·2	·260	·1	·016	·1	·015	·1	·011	·1
Insoluble in HCl of 1·1 sp. gr. ,,	53·594		47·313		59·061		60·190		50·636		54·544	
Total ,,	99·597		100·293		100·264		100·055		99·667		99·518	

* The iron in these soils is partly in form of black magnetic oxide (Fe_3O_4).

Absolute Analysis of—

—	Volcanic Tufa, found near A.		Basaltic Stones, found near B & C.	
		Soluble in boiling HCl of 1·1 sp. gr.		Soluble in boiling HCl of 1·1 sp. gr.
Moist.	6·320		·820	
Comb. water	5·500		2·180	
Sol. SiO_2	31·493	·92	19·388	·40
SO_3				
P_2O_5	·627	·54	·760	·60
Fe_2O_3	13·332	12·00	11·654	9·82
Al_2O_3	16·926	8·86	20·495	7·50
CaO	2·941	1·95	9·314	3·44
MgO	2·761	2·39	6·846	3·82
K_2O	2·243	·04	·473	·16
Na_2O	·621	·02	·330	·02
Insol fr. diff.	17·236	...	27·740	
	100·000	...	100·000	

BIGGENDEN STATE FARM.

DESCRIPTION AND ANALYSIS OF SOILS.

Field or block, and description of the places on the field where the samples of soil were taken	Sample of soil from cultivation paddock; from holes 1, 2, 3		Grazing paddock. Sample from holes 4, 5, 6		Southern grazing paddock. Sample from holes 7, 8, 9.
GENERAL DESCRIPTION AND PROPERTIES—					
Quality of land according to the crops obtained	Forest land, heavily timbered with ironbark, bloodwood, Moreton Bay ash		Forest land, chiefly timbered with ironbark; very poor		Virgin forest land, timbered with ironbark, bloodwood, &c.
How long was land under crop?	Broken up and subsoiled to 1 ft. 8 in. end of '98		No crops grown		Grazing only.
What crops have been grown?	Crops of maize and pumpkins in '99.				
Is land wet or dry?	Dry		Dry		Dry.
Is land drained or not?	Surface drainage, having				
Is land low-lying or elevated?	Slight slope to N.W.		Slight slope to N.E.		
Description of the various layers—					
Surface soil	Brown sandy loam, 12 in.		Grey sandy soil (6 in.), hard, like cement, containing gravel		Chocolate sandy soil, from 12 to 18 in.
Intermed. layer					
Subsoil	Greyish sandy clay		Greyish clayey subsoil		Reddish sandy subsoil.
The Analysis refers to	Soil **21**.	Subsoil **22**.	Soil **23**.	Subsoil **24**.	Soil **25**.	Subsoil **26**.
PROPERTIES OF THE SOIL—						
Reaction	Neutral.	Neutral.	Neutral.	Neutral.	Neutral.	Neutral.
Weight of soil per acre, 6 in. deep... tons	737	780	801	838	789	747
Capacity for water %	52·0	51·9	39·3	47·0	42·6	45·5
Absorbed weight per acre, 6 in. deep tons	383	405	315	394	336	340
Capillary power, inches of water after 6, 24, 36, and 60 hours	3¼, 6½, 8½, 10½	3½, 6¾, 10, 11	4, 8, 11, 13	1, 2¼, 3½, 4¾	9½, 14, 18, 19½	3, 13½, 18, 20
Absorptive powers for Salts c.c. of nitrogen	240	260	114	184	164	192
MECHANICAL ANALYSIS OF THE SOIL—		*Tons per acre, 6 in. deep.*		*Tons per acre, 6 in. deep.*		
Stones over 5 mm. diameter... %	·20	5·10	2·60	12 60	·13	
Gravel over 2 mm. diameter "	1·00	·90	21·70	22·50	·77	·40
Sand "	5·10		3·60	5·56	4·10	4·40
Fine sand "	16·91	22·98	38 38	11·29	33·98	23·11
Clay "	58·22	55·32	28·85	41·77	48·62	56·77
Organic matter and moisture "	18·57	15 70	4·87	6·28	12·40	15·32
Vegetable fibres and roots ...						
Fine earth	*690*	*733*	*578*	*497*	*750*	*711*
CHEMICAL ANALYSIS OF THE SOIL (Fine Earth)—						
Moisture %	8·452	7·900	2·160	4·820	5·030	6·540
Humus "	4·324	1·930	1·920	·668	2·110	·040
Combin. water "	7·039	6·870	2·675	5·097	5·905	9·520
	29·8	*14·1*	*11·1*	*3·3*	*15·8*	*·3*
Chlorine Cl. "	·001	·001	·020	·020	trace	trace
Carbonic acid CO_3 "	·430	·260	·090	·020	·112	0·20
Total nitrogen N "	·140	·045	·060	traces	·112	nil
	1·0	*·3*	*·3*		*·8*	*·0*
Soluble in HCl of 1·1 sp. gr., boiled for two hours—						
Sol. silica SiO_2 "	·224	·246	·090	·070	·182	·321
Sulphuric acid SO_3 "	·049	·068	·040	·027	·030	·013
Phosphoric acid P_2O_5 "	·070	·076	·086	·051	·124	·063
	·5	*·6*	*·5*	*·3*	*·9*	*·4*
Iron Fe_2O_3 "	6·450	9·040	5·680	7·302	10·400	13·760
Alumina Al_2O_3 "	17·050	17·184	3·274	4·612	6·451	8·420
Lime CaO "	1·372	2·699	·058	·117	·212	·140
	9·5	*19·8*	*·3*	*·6*	*1·6*	*1·0*
Magnesia MgO "	2·135	2·874	·365	·630	·529	·760
Potash K_2O "	·056	·026	·211	·249	·100	·080
Soda Na_2O "	·036	·020	·019	·060	·060	·001
	·4	*·2*	*1·2*	*1·2*	*·8*	*·6*
	·2	*·1*	*·1*	*·3*	*·5*	*·0*
Insoluble in HCl of 1·1 sp. gr. "	52 964	50·314	84·022	76 818	69·106	61·112
	14·8	*21·1*	*2·1*	*3·1*	*4·0*	*5·4*
TOTAL "	100·652	99·508	100·710	100·561	100·351	100·790

REDLAND BAY EXPERIMENTAL ORCHARD.

Description and Analysis of Soils.

Field or block, and description of the places on the field where the samples of soil were taken		Red volcanic forest land; from holes Nos. 1, 2, and 3		Virgin forest land; taken near the fence on the road, hole No. 4		Red volcanic virgin scrub land; from hole No. 5		Red volcanic scrub land; from hole No. 6.
General Description and Properties—								
Quality of land according to the crops obtained		Good agricultural land		Very good agricultural land		Very good agricultural land		Good agricultural land.
How long was land under crop?		From ten to fifteen years						About fifteen years.
What crops have been grown?		Chiefly under bananas		No crops		No crops		Under bananas.
Is land wet or dry?		Dry; of great depth						Dry; soil of great depth.
Is land drained or not?		Natural drainage						Natural drainage.
Is land low-lying or elevated?		Slight slope from S. to N.						Slight slope.
Description of the various layers—								
Surface soil		Red chocolate loam (12 in.)		Dark chocolate loamy soil (12 in.)		Chocolate loam (12 in.)		Red chocolate loam (12 in.)
Intermed. layer								
Subsoil		Changing gradually into heavier red loam		Changing into dark-red loamy subsoil		Changing gradually into red loamy subsoil		Red loamy subsoil.

The Analysis refers to		Soil 27.		Subsoil 28.		Soil 29.		Subsoil 30.		Soil 31.		Subsoil 32.		Soil 33.		Subsoil 34.	
Properties of the Soil—																	
Reaction		Neutral.		Neutral.		Neutral.		Neutral.		Neutral		Neutral		Neutral		Neutral	
Weight of soil per acre, 6 in. deep	tons	721		697		691		715		709		703		739		733	
Capacity for water	%	55·2		55·4		60·4		60·2		55·0		55·6		55·6		54·4	
Absorbed weight per acre, 6 in. deep	tons	398		386		417		430		393		391		411		399	
Capillary power, inches of water after 6, 12, 24, 36, and 60 hours		9¼, 11½, 13½, 15½, 17½		10¾, 13½, 16¾, 19¼, 21½		8¾, 10½, 12½, 13¼, 14½		10¾, 13¼, 17, 19¾, 22½		5¼, 6¾, 8¾, 9¾, 12		10¾, 13¾, 17, 17, 21¼		7¾, 8¾, 11, 12½, 14¾		10½, 12¾, 15½, 18½, 21½	
Absorptive powers for salts	c.c. of nitrogen	116		88		96		80		96		84		96		84	
Mechanical Analysis of the Soil—																	
Stones over 5 mm. diameter	%	·22		·08		...		·03		·00		·06		·08		...	
Gravel over 2 mm. diameter	,,	...		·13		·002		·02		·00		·01		·01		·02	
Sand	,,	11·84		7·15		7·81		4·70		7·89		5·91		7·40		5·84	
Fine sand	,, Fine earth	11·75		7·46		15·19		6·52		10·21		17·17		11·20		12·38	
Clay	,, Fine earth	56·61	634	69·25	646	57·668	636	72·54	681	61·32	653	59·74	668	62·48	684	65·69	690
Organic matter and moisture	,, Fine earth	19·58		15·93		19·300		16·19		20·56		17·10		18·82		16 07	
Vegetable fibres and roots	,,	...		...		·03		...		·02		·01		·01		...	...
Chemical Analysis of the Soil (Fine Earth)—																	
Moisture	,,	6·280		4·360		5·460		4·44		6·91		4·05		4·21		3·80	
Humus	,,	4·180	26·5	1·230	7·9	4·590	29·2	1·01	6·9	5·58	36·4	1·36	9·1	3·83	26·2	1·24	8·6
Combin. water	,,	9·100		10·350		9·150		10·74		8·07		11·79		10·78		11·03	
Chlorine	Cl ,,	·020		·020		·020		·01		·01		·01		·01		·01	
Carbonic acid	CO_2 ,,	·890		·460		·990		·34		1·07		·50		1·15		·67	
Total nitrogen	N ,,	·150	1·0	...	0	·229	1·4	·06	4	·32	2·1	·10	7	·27	1·8	·09	6
Soluble in HCl of 1·1 sp. gr., boiled for two hours—																	
Sol. silica	SiO_2 ,,	·18		·33		·35		·20		·19		·37		·21		·15	
Sulphuric acid	SO_3 ,,	·16		·12		·16		·17		·20		·15		·22		·18	
Phosphoric acid	P_2O_5 ,,	·05	3	·05	3	·07	5	·10	7	·26	1·7	·19	1·3	·31	2·1	·22	1·5
Iron	Fe_2O_5 ,,	10·97		10·64		14·80		16·01		8·62		9·29		10·42		9·52	
Alumina	Al_2O_5 ,,	27·00		33·69		23·93		28·09		28·78		32·32		27·75		30·62	
Lime	CaO ,,	·63	4·0	·24	1·6	·53	3·4	·26	1·8	·70	4·6	·64	4·3	·80	5·5	·44	3·0
Magnesia	MgO ,,	1·10	7·0	1·04	6·7	1·53	9·7	1·20	8·2	1·40	9·1	1·01	6·7	1·36	9·3	1·10	7·6
Potash	K_2O ,,	·52	3·3	·64	4·1	·60	3·8	·37	2·5	·71	4·6	·50	3·3	·65	4·4	·40	2·8
Soda	Na_2O ,,	·05	3	·06	4	·12	8	·10	7	·15	1·0	·17	1·1	·19	1·3	·08	6
Insoluble in HCl of 1·1 sp. gr.	,,	38·90		37·10		37·87		37·10		38·45		37·39		38·47		40·01	
Total	,,	100·03		100·33		100·17		100·14		101·10		99·74		100·36		99·47	

AGRICULTURAL COLLEGE, GATTON.

DESCRIPTION AND ANALYSIS OF SOILS.

Field or block, and description of the places on the field where the samples of soil where taken	College Hill Orchard; 3 holes—1, 2, 3	College Hill Vineyard; holes Nos. 4, 5, and 6	River flats, potato patch near Lockyer, 25 acres; holes Nos. 1, 2, and 3	River flats, late bull paddock, 36 acres; holes 4, 5, and 6.
GENERAL DESCRIPTION AND PROPERTIES—				
Quality of land according to the crops obtained	Forest land, lightly timbered, chiefly ironbark, spotted gum	Forest land, lightly timbered, ironbark and spotted gum	Rich alluvial flats, ironbark, apple trees.	Lightly timbered with spotted gum.
How long was land under crop?	Broken up in '99	Broken up in '99	New land	New land
What crops have been grown?				
Is land wet or dry?	Dry	Dry.		
Is land drained or not?	Natural drainage	Natural drainage	Fairly evel	Fairly level, with a few melon holes towards S. and W.
Is land low-lying or elevated?	Sloping to E.	Sloping to E		
Description of the various layers—				
Surface soil	Poor sandy soil (14, 11 and 7½ in. deep)	Poor sandy soil (14, 8, and 11 in. deep)	Rich black alluvial soil (12 in.)	Rich back alluvial soil (12 in.).
Intermed. layer	Poor gravelly layer of 1 to 3 in. depth	A gravelly layer, 1 to 3 in.	Changing gradually into	Changing gradually into
Subsoil	Stiff sandy clay	Stiff sandy clay	Black clayey subsoil of great depth	Black clayey subsoil.

The Analysis refers to	Soil 35.		Subsoil 36.		Soil 37.		Subsoil 38.		Soil 39.		Subsoil 40.		Soil 41.		Subsoil 42.	
PROPERTIES OF THE SOIL—																
Reaction	Neutral.		Neutral.		Neutral.		Neutral.		Neutral.		Neutral.		Neutral.		Neutral.	
Weight of soil per acre, 6 in. deep ... tons	995		819		989	...	807	...	789	...	862	...	777	...	832	
Capacity for water ... %	46·3		42·2		25·1	..	42·1	...	47·7	...	40·8	..	50·0	...	53·2	
Absorbed weight per acre, 6 in. deep ... tons	461		346		248	...	339	...	376	...	352	...	389	...	442	
Capillary power, inches of water after 6, 12, 24, 36, and 60 hours	7½, 10, 12, 13, 14½		2½, 3½, 3¾, 4, 4½		7⅛, 10½, 13, 14, 16	..	2½, 4, 4¾, 5½, 6½	...	4½, 6¾, 11½, 15, 17	...	3¼, 6¾, 7½, 10, 11½	...	2, 3½, 4½, 6½, 8	...	2¼, 3¾, 4¾, 6¼, 7	
Absorptive powers for salts ... c.c. of nitrogen	4		4		4	...	26	...	46	...	88	...	116	...	192	
MECHANICAL ANALYSIS OF THE SOIL—		*Tons per acre, 6 in. deep.*		*Tons per acre, 6 in. deep.*												
Stones over 5 mm. diameter %	4·69	...														
Gravel over 2 mm. diameter ,,	7·40	...	7·14	...	9·26	...	17·32									
Sand ,,	14·45	...	10·62	...	7·39	...	8·03									
Fine sand ,,	53·79	...	18·69	...	11·93	...	17·40	...	3·55	...	3·40	...	2·46	...	2·29	
Clay ,,	17·47		35·80		54·90		22·28		·86		1·00		·63		·75	
Organic matter and moisture ,,	2·20	731	22·72	520	13·98	706	28·77	462	83·02	761	83·97	833	80·55	758	80·37	812
Vegetable fibre and roots ...	...	...	5·03	...	2·54	...	6·20	...	12·57	...	11·63	...	16·36	...	16·59	...
CHEMICAL ANALYSIS OF THE SOIL (Fine Earth)—																
Moisture ,,	·866	...	3·551	...	1·105	...	4·397	...	4·612	...	6·807	...	5·110	...	7·278	
Humus ,,	1·255	9·2	·617	3·2	1·158	8·2	·715	3·3	3·287	25·0	1·836	15·3	3·620	27·4	1·912	15·5
Combin. water ,,	·829	...	3·742	...	1·292	...	5·717	...	4·140	...	3·397	...	8·050	...	7·790	
Chlorine Cl ,,	·004	...	·000	...	·004	...	·000	...	·005	...	·000	...	·005	...	·000	
Carbonic acid CO_2 ,,	·180	...	·090	...	·180	...	·240	...	·540	...	·322	...	·490	...	·280	
Total nitrogen N ,,	·025	·2	·020	·1	0·56	·4	·060	·3	·175	1·3	·123	1·0	·120	·9	·105	·9
Soluble in HCl of 1·1 sp. gr., boiled for two hours—																
Sol. silica SiO_2 ,,	·074	...	·172	...	·039	...	·035	...	·193	...	·180	...	·140	...	·121	
Sulphuric acid SO_3 ,,	·070	...	·093	...	·044	...	·044	...	·052	...	·023	...	·060	...	·051	
Phosphoric acid P^2O_5 ,,	·046	·3	·030	·2	·063	·4	·002	·0	·342	2·6	·256	2·1	·327	2·5	·304	2·5
Iron Fe^2O_5 ,,	2·400	...	5·403	...	2·200	...	6·600	...	7·400	...	6·800	...	6·727	...	7·328	
Alumina Al_2O_3 ,,	1·876	...	11·055	...	2·445	...	15·111	...	6·733	...	8·746	...	8·710	...	11·505	
Lime CaO ,,	·124	·9	·152	·8	·135	1·0	·122	·6	1·010	7·7	1·224	10·2	·940	7·1	·900	7·3
Magnesia MgO ,,	·117	·9														
Potash K_2O ,,	·152	1·1	·292	1·5	·090	·6	·348	1·6	1·052	8·0	1·150	9·6	·995	7·5	1·200	9·7
Soda NaO_2 ,,	·140	1·0	·076	·4	·043	·3	·136	·6	·240	1·8	·252	2·1	·220	1·7	·232	1·9
			·200	1·0	·073	·5	·138	·6	·167	1·3	·185	1·5	·180	1·4	·151	1·2
Insoluble in HCl of 1·1 sp. gr. ,,	92·229	...	74·529	...	90·900	...	67·016	...	70·850	...	69·750	...	65·570	...	61·735	
TOTAL ,,	100·362	...	100·002	...	99·771	...	100·621	...	100·623	...	100·928	...	101·144	...	100·787	

AGRICULTURAL COLLEGE, GATTON.

DESCRIPTION AND ANALYSIS OF SOILS.

Field or block, and description of the places on the field where the samples of soil where taken	College Hill Orchard; 3 holes—1, 2, 3	College Hill Vineyard; holes Nos. 4, 5, and 6	River flats, potato patch near Lockyer, 25 acres; holes Nos. 1, 2, and 3	River flats, late bull paddock, 36 acres; holes 4, 5, and 6.
GENERAL DESCRIPTION AND PROPERTIES—				
Quality of land according to the crops obtained	Forest land, lightly timbered, chiefly ironbark, spotted gum	Forest land, lightly timbered, ironbark and spotted gum	Rich alluvial flats, ironbark, apple trees.	Lightly timbered with spotted gum.
How long was land under crop?	Broken up in '99	Broken up in '99	New land	New land
What crops have been grown?				
Is land wet or dry?	Dry	Dry.		
Is land drained or not?	Natural drainage	Natural drainage	Fairly evel	Fairly level, with a few melon holes towards S. and W.
Is land low-lying or elevated?	Sloping to E.	Sloping to E		
Description of the various layers—				
Surface soil	Poor sandy soil (14, 11 and 7¼ in. deep)	Poor sandy soil (14, 8, and 11 in. deep)	Rich black alluvial soil (12 in.)	Rich back alluvial soil (12 in.).
Intermed. layer	Poor gravelly layer of 1 to 3 in. depth	A gravelly layer, 1 to 3 in.	Changing gradually into	Changing gradually into
Subsoil	Stiff sandy clay	Stiff sandy clay	Black clayey subsoil of great depth	Black clayey subsoil.

The Analysis refers to	Soil 35.		Subsoil 36.		Soil 37.		Subsoil 38.		Soil 39.		Subsoil 40.		Soil 41.		Subsoil 42.	
PROPERTIES OF THE SOIL—																
Reaction	Neutral.		Neutral.		Neutral.		Neutral.		Neutral.		Neutral.		Neutral.		Neutral.	
Weight of soil per acre, 6 in. deep tons	995		819		989	...	807	...	789	...	862	...	777	...	832	
Capacity for water %	46·3		42·2		25·1	..	42·1	...	47·7	...	40·8	..	50·0	...	53·2	
Absorbed weight per acre, 6 in. deep tons	461		346		248	...	339	...	376	...	352	...	389	...	442	
Capillary power, inches of water after 6, 12, 24, 36, and 60 hours	7½, 10, 12, 13, 14½		2½, 3½, 3¾, 4, 4½		7⅛, 10½, 13, 14, 16	..	2½, 4, 4¾, 5½, 6½	...	4½, 6¾, 11½, 15, 17	...	3¼, 6¾, 7½, 10, 11½	...	2, 3½, 4½, 6½, 8	...	2¼, 3¾, 4¾, 6¼, 7	
Absorptive powers for salts c.c. of nitrogen	4	*Tons per acre, 6 in. deep.*	4	*Tons per acre, 6 in. deep.*	4	...	26	...	46	...	88	...	116	...	192	
MECHANICAL ANALYSIS OF THE SOIL—																
Stones over 5 mm. diameter %	4·69															
Gravel over 2 mm. diameter "	7·40	...	7·14	...	9·26	...	17·32									
Sand "	14·45	...	10·62	...	7·39	...	8·03									
Fine sand "	53·79	...	18·69	...	11·93	...	17·40	...	3·55	...	3·40	...	2·46	...	2·29	
Clay "	17·47		35·80		54·90		22·28		·86		1·00		·63		·75	
Organic matter and moisture " Fine earth	2·20	*731*	22·72	*520*	13·98	*706*	28·77	*462*	83·02	*761*	83·97	*833*	80·55	*758*	80·37	*812*
Vegetable fibre and roots	...	...	5·03	...	2·54	...	6·20	...	12·57	...	11·63	...	16·36	...	16·59	...
CHEMICAL ANALYSIS OF THE SOIL (Fine Earth)—																
Moisture "	·866	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Humus "	1·255	*9·2*	3·551	...	1·105	...	4·397	...	4·612	...	6·807	...	5·110	...	7·278	
Combin. water "	·829	...	·617	*3·2*	1·158	*8·2*	·715	*3·3*	3·287	*25·0*	1·836	*15·3*	3·620	*27·4*	1·912	*15·5*
			3·742	...	1·292	...	5·717	...	4·140	...	3·397	...	8·050	...	7·790	
Chlorine Cl "	·004	...	·000	...	·004	...	·000	...	·005	...	·000	...	·005	...	·000	
Carbonic acid CO_2 "	·180	...	·090	...	·180	...	·240	...	·540	...	·322	...	·490	...	·280	
Total nitrogen N "	·025	*·2*	·020	*·1*	0·56	*·4*	·060	*·3*	·175	*1·3*	·123	*1·0*	·120	*·9*	·105	*·9*
Soluble in HCl of 1·1 sp. gr., boiled for two hours—																
Sol. silica SiO_2 "	·074	...	·172	...	·039	...	·035	...	·193	...	·180	...	·140	...	·121	
Sulphuric acid SO_3 "	·070	...	·093	...	·044	...	·044	...	·052	...	·023	...	·060	...	·051	
Phosphoric acid P^2O_5 "	·046	*·3*	·030	*·2*	·063	*·4*	·002	*·0*	·342	*2·6*	·256	*2·1*	·327	*2·5*	·304	*2·5*
Iron Fe^2O_5 "	2·400	...	5·403	...	2·200	...	6·600	...	7·100	...	6·800	...	6·727	...	7·328	
Alumina Al_2O_3 "	1·876	...	11·055	...	2·445	...	15·111	...	6·733	...	8·746	...	8·710	...	11·505	
Lime CaO "	·124	*·9*	·152	*·8*	·135	*1·0*	·122	*·6*	1·010	*7·7*	1·224	*10·2*	·940	*7·1*	·900	*7·3*
Magnesia MgO "	·117	*·9*														
Potash K_2O "	·152	*1·1*	·292	*1·5*	·090	*·6*	·348	*1·6*	1·052	*8·0*	1·150	*9·6*	·995	*7·5*	1·200	*9·7*
Soda NaO_2 "	·140	*1·0*	·076	*·4*	·043	*·3*	·136	*·6*	·240	*1·8*	·252	*2·1*	·220	*1·7*	·232	*1·9*
			·200	*1·0*	·073	*·5*	·138	*·6*	·167	*1·3*	·185	*1·5*	·180	*1·4*	·151	*1·2*
Insoluble in HCl of 1·1 sp. gr. "	92·229	...	74·529	...	90·900	...	67·016	...	70·850	...	69·750	...	65·570	...	61·735	
TOTAL "	100·362	...	100·002	...	99·771	...	100·621	...	100·623	...	100·928	...	101·144	...	100·787	

Field s. 4, sam	River flats, potato patch near Lockyer, 25 acres; holes Nos. 1, 2, and 3	River flats, late bull paddock, 36 acres; holes 4, 5, and 6.
GENEI Q ron-	Rich alluvial flats, ironbark, apple trees.	Lightly timbered with spotted gum.
H W ... Is Is Is ... D ...	New land	New land
	Fairly evel	Fairly level, with a few melon holes towards S. and W.
eep)	Rich black alluvial soil (12 in.) ...	Rich back alluvial soil (12 in.).
... ...	Changing gradually into ... ... Black clayey subsoil of great depth ...	Changing gradually into Black clayey subsoil.

	Soil 39.		Subsoil 40.		Soil 41.		Subsoil 42.	
PROPE								
R								
W...	Neutral.	....	Neutral.	....	Neutral.	...	Neutral.	
C...	789	...	862	...	777	...	832	
A...	47·7	...	40·8	..	50·0	...	53·2	
C...	376	...	352	...	389	...	442	
...	4½, 6¾, 11½, 15, 17	...	3¼, 6¾, 7½, 10, 11½	...	2, 3½, 4½, 6½, 8	...	2¼, 3¾, 4¾, 6¼, 7	
A...	46	...	88	....	116	...	192	
MECH								
Si								
G								
Si...	3·55	...	3·40	...	2·46	...	2·29	
F...	·86		1·00		·63		·75	
C 62	83·02	761	83·97	833	80·55	758	80·37	812
O	12·57		11·63		16·36		16·59	
V...		...	...	...	...	...	...	...
CHEM								
M								
H 3	4·612	...	6·807	....	5·110	...	7·278	
C...	3·287	25·0	1·836	15·3	3·620	27·4	1·912	15·5
	4·140	...	3·397	...	8·050	...	7·790	
C								
C...	·005	...	·000	.....	·005	...	·000	
T 3	·540	...	·322	.....	·490	...	·280	
	·175	1·3	·123	1·0	·120	·9	·105	·9
S(								
...	·193	...	·180	.....	·140	...	·121	
...	·052	....	·023	....	·060	....	·051	
·0	·342	2·6	·256	2·1	·327	2·5	·304	2·5
...	7·100	...	6·800	.....	6·727	....	7·328	
..	6·733	...	8·746	.....	8·710	...	11·505	
·6	1·010	7·7	1·224	10·2	·940	7·1	·900	7·3
·6	1·052	8·0	1·150	9·6	·995	7·5	1·200	9·7
·6	·240	1·8	·252	2·1	·220	1·7	·232	1·9
·6	·167	1·3	·185	1·5	·180	1·4	·151	1·2
IN								
..	70·850	....	69·750	.....	65·570	....	61·735	
..	100·623	...	100·928	....	101·144	...	100·787	

UTILISING WIND POWER IN THE BARN.

Notwithstanding the march of science which has largely conduced to substituting mechanical power for hand labour on the farm, we yet see on outlying farms the old, old methods employed. The chipping hoe and seed-bag, the hand cornsheller and sieve, husking corn by hand, digging potatoes with a long-handled shovel, two men employed to grind an axe, and so on. How is it that, whilst farmers in the United States are continually inventing some useful farm implement calculated to save a world of labour, our Queensland small farmers not only are guiltless of invention, but will not even take the trouble to profit by the inventive genius of our American brethren? There is one motive power which is utterly ignored by farmers (except when they have sunk a well)—a power which for centuries has ground the corn of Europe and America—a power which carries millions of tons of produce daily over many thousand miles of water. That power is the wind. If we suggest windmills to a farmer for any other purpose but pumping water he scorns the notion. "Wind isn't certain," he says. "If I want to thresh corn by the help of a windmill, and the wind drops, where am I? No better off." He quite fails to observe that his water-raising windmill comes to a standstill at times, and yet he would not like to go half-a-dozen times a day to the swamp with a bucket, as he did in the good old days. Supposing he were threshing corn or grinding an axe by wind power, and the wind dropped, why should he not take up some other necessary job until a breeze again consented to turn the sails? It is the old conservatism which expresses itself in the words, "It was good enough for my old man, and it will serve my time," which is the stumbling-block in the way of using appliances which would greatly simplify and expedite many kinds of work. Now here is an idea which is in practical operation on many farms in the State of Connecticut (U.S.A.). The description is taken from the *Rural New Yorker*, and is well worth perusal, being written by one of the farmers, whose idea it is:—The illustration shows my windmill and the pile of wood sawn with it. This shows that there is sufficient available power in a 12-feet geared mill to run all machines necessary on a farm. Notice the size of those blocks. Some of them

are 20 inches across, old, dry apple and knotty ash, which are very hard; yet they were all sawn without stopping the saw. This mill runs a thresher that cleans the grain from the straw and chaff at one operation. A boy fifteen years old and myself got from the mow and threshed twenty shocks of oats in one

hour. My mill grinds all kinds of feed, fine or coarse, and cornmeal or Graham flour for table use. We cut our cornstalks with a big fodder cutter. All of these machines are run on the west barn floor, which necessitated putting up 44 feet of horizontal shafting.

Another farmer, living in Ohio, describes in the *Rural New Yorker* in detail the method of fixing up windmills on barns. There are many ways, he says, of putting a windmill on a barn, and each barn frame will suggest a different plan. Fig. 1 shows how we did at Woodside Farm. The mast, B, is

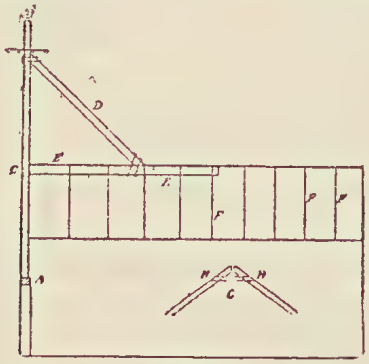


FIG. 1.

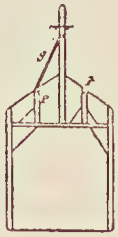


FIG. 2.

31 feet long. It rests on the "tie," A, into which it is morticed. This tie is just a little below the level of the "square," as in most old-fashioned barns. From the tie to the comb of the roof at C is 15 feet. F F F are rafters. E is a piece of 6 inches by 6 inches let in between the ends of the rafters. To put it in we first nailed strips of board across from one rafter to the other, as shown at G. Then the ends of the rafters were sawn off, 3 inches from each, so that the 6 inches by 6 inches stick would just drop into the notch. It was put in place, and the rafters nailed firmly to it when the temporary supports were knocked off. The brace, D, is also 6 inches by 6 inches, and firmly bolted at each end with two $2\frac{1}{2}$-inch bolts. This bolting is necessary, because the brace must hold from going out as well as coming in. At C, a strap of iron passes around the mast, and bolts firmly to the horizontal piece, E.

Fig. 2 shows an end elevation of the frame. The purlin plates, P, are arranged as in most barns. On one of them rests the foot of the brace, S. This brace, too, is firmly bolted at bottom and top. It would have been as well to have used two of these braces, one on each side; but I did not do it, partly because I did not care to have so many places to make watertight in the roof. Do not fail to make this mast solid and safe. It will be a satisfaction to have it so when you go up to oil, and the wind is blowing a gale. Speaking of oil, do not forget that the life and much of the efficiency of the mill and machinery will depend on keeping it oiled. What would you think of an engineer who would oil only once a week? An aermotor runs very rapidly, being geared high, and should be oiled before each full day's work, oftener if you are an enthusiast on the subject of taking care of machinery. For moderate work and light winds and common pumping, I find once a week often enough.

For a 12-feet aermotor let these braces reach to within $4\frac{1}{2}$ feet of the top of the mast. The centre of the wheel will be above the top. Let the mast be full 8 inches by 8 inches in size. Another plan is applicable to barns where the mill is wanted near the centre. It has been tried by some of my neighbours. It works well. The mast is set on the purlin plate, and extends as far through the roof as is desired, 20 feet being a good height, and is stayed by four wire cables, one reaching to each corner post of the barn. These cables are made right on the spot of common galvanised fence wire, No. 9, six strands being used. These wires are first put up and stretched tolerably tight, when they are twisted by putting in a stick and twisting. Care is used to tighten each cable alike, so that the mast will stand perpendicularly. This is even a safer way than mine, as the cables run quite obliquely, and are of immense strength. It would take about four tons' pull to break one of them.

EXPLANATION OF TERMS USED IN DISCUSSING FERTILISERS.

Complete Fertiliser is one which contains the three essential fertilising constituents—*i.e.*, nitrogen, phosphoric acid, and potash.

Nitrogen exists in fertilisers in three distinct forms—viz., as organic matter, as ammonia, and as nitrates. It is the most expensive fertilising ingredient.

Nitrates furnish the most readily available forms of nitrogen. The most common are nitrate of soda and nitrate of potash (saltpetre).

Phosphoric acid, one of the essential fertilising ingredients, is derived from materials called "phosphates." It does not exist alone, but in combination, most commonly as phosphate of lime in the form of bones, rock phosphate, and phosphatic slag. Phosphoric acid occurs in fertilisers in three forms—soluble, reverted, and insoluble phosphoric acid.

Soluble phosphoric acid is that form which is soluble in water and readily taken up by plants.

Reverted phosphoric acid is that form which is insoluble in water, but still readily used by plants.

Available phosphoric acid is the soluble and reverted taken together.

Superphosphate.—In natural or untreated phosphates the phosphoric acid is insoluble in water and not readily available to plants. Superphosphate is prepared from these by grinding and treating with sulphuric acid, which makes the phosphoric acid more available to plants. Superphosphates are sometimes called "acid phosphates."

Potash, as a constituent of fertilisers, exists in a number of forms, but chiefly as chloride or muriate and as sulphate. All forms are freely soluble in water, and are believed to be nearly, if not quite, equally available, but it has been found that the chlorides may injuriously affect the quality of tobacco, potatoes, and certain other crops. The chief sources of potash are the potash salts from Stassfurt, Germany—kainit, sylvinit, muriate of potash, sulphate of potash, and sulphate of potash and magnesia. Wood ashes and cotton-hull ashes are also sources of potash.

TERMS USED IN DISCUSSING FOODS AND FEEDING STUFFS.

Water is contained in all foods and feeding stuffs. The amount varies from 8 to 15 lb. per 100 lb. of such dry materials as hay, straw, or grain to 80 lb. in silage and 90 lb. in some roots.

Dry matter is the portion remaining after removing or excluding the water.

Ash is what is left when the combustible part of a feeding stuff is burned away. It consists chiefly of lime, magnesia, potash, soda, iron, chlorine, and carbonic, sulphuric, and phosphoric acids, and is used largely in making bones. Part of the ash constituents of the food is stored up in the animal's body; the rest is voided in the urine and manure.

Protein (nitrogenous matter) is the name of a group of substances containing nitrogen. Protein furnishes the materials for the lean flesh, blood, skin, muscles, tendons, nerves, hair, horns, wool, casein of milk, albumen of eggs, &c., and is one of the most important constituents of feeding stuffs.

Albuminoid nitrogen is nitrogen in the form of *albuminoids*, which is the name given to one of the most important groups of substances classed together under the general term "protein." The albumen of eggs is a type of albuminoids.

Amid nitrogen is nitrogen in the form of *amids*, one of the groups of substances classed together under the general term "protein." Amids, unlike albuminoids, are usually soluble in water, but are generally considered of less value as food than albuminoids.

Carbohydrates.—The nitrogen-free extract and fibre are often classed together under the name of "carbohydrates." The carbohydrates form the largest part of all vegetable foods. They are either stored up as fat or burned in the body to produce heat and energy. The most common and important carbohydrates are sugar and starch.

Fibre, sometimes called "crude cellulose," is the framework of plants, and is, as a rule, the most indigestible constituent of feeding stuffs. The coarse fodders, such as hay and straw, contain a much larger proportion of fibre than the grains, oil cakes, &c.

Nitrogen-free extract includes starch, sugar, gums, and the like, and forms an important part of all feeding stuffs, but especially of most grains.

Fat, or the materials dissolved from a feeding stuff by ether, is a substance of mixed character, and may include, besides real fats, wax, the green colouring matter of plants, &c. The fat of food is either stored up in the body as fat or burned, to furnish heat and energy.

MISCELLANEOUS TERMS.

Fungus (plural *fungi*) is a low form of plant life destitute of green colouring matter; mould and mushrooms are familiar examples.

Spore is a minute body, borne by a fungus, which is capable of reproducing the fungus directly. It corresponds in function with the seed of higher plants.

Bacillus (plural *bacilli*) is a genus of *bacteria*, which is the name applied in common to a number of different or closely related microscopic organisms, all of which consist of single short cylindrical or elliptical cells or two such cells joined end to end and capable of spontaneous movement. Many kinds of bacteria are harmful, and cause diseases and other injurious effects; but many are beneficial. Among the latter are those which give aroma to tobacco and flavour to butter and cheese, and those which enable leguminous plants to use the free nitrogen of the air.

Inoculation is the introduction of bacteria or other organisms into surroundings suited to their growth with a view to producing the effects which are the result of their activity.

MANURE FOR TOMATOES.

MR. J. J. WILLIS, one of the chief coadjutors of Sir John Lawes, has contributed a valuable article to the *Gardener's Magazine* on this subject. It appears to be based mainly upon the results of numerous experiments carried out in recent years in the experimental stations of the United States, where a great deal of attention has been devoted to the growth of tomatoes. It is a prevalent idea that the tomato will not stand heavy manuring, but Mr. Willis says this is true only of the crop after the fruit has set. In the early stages of development, nitrogen, phosphoric acid, and potash may be liberally supplied with advantage, but after the fruit has set manuring with farmyard manure or other stimulating fertilisers delays the development and ripening of the fruit. A good manure, he says, is made up as follows: 2 parts of nitrate of soda, 2 parts of bonemeal, 3 parts of kainit, and 4 parts of superphosphate. Of this mixture 1 oz. per square yard of soil may be applied weekly, from the time that the plants are established till the fruit has set. Superphosphate has been found to hasten the maturing of the fruit.

DIRECTOR BOTANIC GARDENS MELBOURNE

Animal Pathology.

BLACKLEG OR QUARTER-ILL.

Abstracts from a Report by VICTOR A. NORGAARD, V.S., Copenhagen,

Chief of the Pathological Division, Bureau of Animal Industry, U.S.A.

Preventive Vaccination.—To Arloing, Cornevin, and Thomas belong the honour of first discovering that animals may be protected against blackleg by inoculation with more or less virulent material obtained from animals which have died from blackleg. They found that the hypodermic injection of minimal doses of fluid from a blackleg tumour did not necessarily result in death, but frequently produced a mild attack of the disease, unaccompanied by any swelling, and that animals treated in that way were afterwards possessed of a very high degree of resistance against the disease. There are, however, few diseases where the individual susceptibility varies to a greater extent than is the case in blackleg, and, as it was impossible to ascertain beforehand the degree of susceptibility or power of resistance possessed by each animal, the exact dose to employ in each case could not be determined, and the method was abandoned as being too dangerous. Even when the inoculation was made at the extremity of the tail it frequently resulted in the development of a swelling which spread to the rump and killed the animal, or else the tail became gangrenous and dropped off.

When the virus, either fresh from a tumour or dried, is introduced into the blood-stream or into the trachea, the animal shows great resistance to its effect, and subsequently becomes immunised. It is, however, rather difficult to inject the virus either into the jugular vein or into the trachea without infecting the surrounding connective tissue, and the technique of the operation is too complicated to be of practical value when large numbers of cattle are to be vaccinated. Nevertheless, the French scientists practised it on 500 animals with one death only resulting from the operation.

Attenuated Virus.—Prolonged exposure to a high temperature serves to attenuate the virulence of either fresh or dried virus. The fact was employed by the above-mentioned authors for the preparation of a vaccine which may be used in everyday practice with little danger of injuring the cattle. The material used for the vaccine is obtained from a fresh blackleg tumour, by pounding the muscle tissue in a mortar with the addition of a little water, and squeezing the pulp through a piece of linen cloth. The juice is spread in layers on plates and dried quickly at a temperature of about 35 degrees C. This temperature does not in the least affect the germs, and the dry virus obtained in this way retains a high degree of virulence for a couple of years or more.

When vaccine is to be prepared, the dried material is pulverised and mixed in a mortar with two parts water until it forms a semifluid homogeneous mass. This is spread in a thin layer on a saucer or glass dish, and placed in an oven, the temperature of which may be regulated with exactness. The reason for mixing the virus with water is to insure a quicker and more uniform attenuation. The temperature of the oven is previously brought up to 100 degrees to 104 degrees C., and the virus is allowed to remain in it for seven hours. When removed, it appears as a brownish scale, which is easily detached from the dish. This scale is pulverised and mixed with water, and when inoculated under the skin of calves in doses of 1 centigram per head it produces partial immunity. Subsequent inoculation with virus which has been heated for the same length of time, but, at a temperature of 90 degrees to 94 degrees C., serves to re-enforce the immunity. The inoculation is followed by insignificant symptoms. In a

few cases there is a slight rise of temperature, and by close observation a minute swelling may sometimes be noted at the point of inoculation. Eight or ten days are allowed to pass between the first and the second inoculation. For reasons already explained, the vaccine is injected at a place where the subcutaneous connective tissue is dense and unelastic, generally at the extremity of the tail or the external surface of the ear, as far from the base of either organ as possible. The immunity conferred in this way lasts for at least eighteen months, but animals which are vaccinated before they are one year old should be revaccinated the following year.

This method of vaccination for blackleg, popularly known as "the French method," "Arloing's method," or the "Lyons method,"* was first introduced in 1883, and was generally adopted the following two years. Several thousand cattle were vaccinated in France, Switzerland, and Germany, and the results were highly satisfactory. The operation, however, is very cumbersome on account of the great density of the subcutaneous tissue of the tail, which makes it difficult to insert the needle; in fact, it is necessary first to punch a hole with a strong trocar and loosen the skin sufficiently to form a sack or pocket large enough to receive the vaccine. Afterwards a ligature is tied around the tail to prevent the vaccine from escaping through the hole, and this ligature must be removed a short time after, so as not to interfere with the circulation. When the inoculation is made too close to one of the joints, the needle is liable to wound the cartilaginous discs, and cause the formation of an abscess, which may result in necrosis and the dropping off of the tail. In any case, the operation has to be performed by an expert, besides requiring considerable time. Consequently, when large numbers of cattle were to be vaccinated the method was both expensive and inconvenient, and when a modification was suggested it was eagerly excepted. In 1888 Professor Kitt, of the Veterinary College in Munich, Bavaria, took up the question, and, after experimenting with Arloing's vaccine on a number of animals, came to the conclusion that the second vaccine may be injected alone without any danger to the animal, and that such a single vaccination confers immunity against subsequent attacks of the disease He went even further and prepared a vaccine which was heated for six hours only at a temperature from 85 degrees to 90 degrees C., which as compared to Arloing's second vaccine (90 degrees to 94 degrees C. for seven hours) was considerably stronger, but which he proved by experiments to be free from danger, even when injected in doses tenfold larger than those ordinarily used. A single injection with this vaccine was found to produce complete immunity when treated by subsequent inoculations with fatal doses of blackleg virus. He further modified Arloing's method by making the injections in the shoulder region, where the skin is loose and easily pierced by the needle. For the preparation of the vaccine, Kitt employed the affected muscles from a fresh blackleg tumour, which he cut in thin strips and dried at a temperature of 35 degrees C. and then pulverised in a coffee-mill. This process in the manufacture of the vaccine was also an improvement on Arloing's method, which, as will be remembered, consists in pressing the juice from a blackleg tumour and drying it on plates.

In his publication on this matter Kitt recommends that experiments be made on large numbers of cattle with injections of Arloing's second vaccine—in the shoulder region—and that the results be published for the benefit of others who might wish to employ this much quicker and more convenient method. He adds that before vaccinating a large number of animals the vaccine should be tested on guinea-pigs or on a few head of young cattle to ascertain the quality of the material.

Acting on these suggestions, a number of veterinarians undertook vaccinations with second vaccine alone, and in most cases the results were equally satisfactory to those obtained through double vaccination. In Algeria, M.

* The laboratories of Arloing, Cornevin, and Thomas are located at Lyons, France.

Bremond vaccinated 4,000 head of the half-wild range cattle with second vaccine alone, making the injections behind the shoulder. The subsequent loss from blackleg was even smaller than that reported in Europe as resulting after double vaccination, but it must be remembered that the range cattle of Algeria are very resistant to blackleg.

Subsequently a stronger vaccine, as recommended by Kitt, was prepared at various veterinary institutes—for instance, at Edinburgh, Scotland—but it proved to be too strong. The vaccine was heated for six hours at 90 degrees C, and was proved experimentally to be harmless; but in one instance, when used on fifteen head of cattle, it caused five to die in the course of three days, and two more died, three to four weeks after vaccination, from typical blackleg. This highly unfavourable result cannot well be explained. It is generally conceded that when the vaccine is strong enough to cause one or more cases of blackleg as a result of the inoculation, the surviving animals must be strongly fortified against subsequent infection. In this case, however, two of the vaccinated calves died of typical blackleg at a time when, for obvious reasons, the disease could not be attributed to the operation.

This experience caused considerable prejudice against protective vaccination for blackleg, which later experiments failed to dispel, and up to the present time the method has never become popular in Scotland and England. In the meantime double vaccination in the shoulder region had been very generally accepted as preferable to inoculations in the tail. M. Strebel stated in 1892 that forty to forty-five animals may be vaccinated in an hour by the former method, and also that of a total of 13,022 animals treated by this method only five head, or 0·038 per cent., died directly from the inoculation, while the immediate loss among cattle vaccinated on the tail amounts to twice as much. Out of a total of 158,579 vaccinated animals (both methods) 493 head, or 0·31 per cent., died from spontaneous blackleg—that is, the vaccination had in these cases failed to produce immunity. On the other hand, the loss among 106,787 unvaccinated animals amounted to 2,049 head, or 1·92 per cent.—more than six times as great as among the vaccinated ones. These results were highly satisfactory, and proved that preventive inoculation with attenuated virus was a safe and effective remedy against the disease. It was furthermore observed that blackleg occurred with less frequency among the unvaccinated cattle in pastures where vaccination was practised to some extent for a number of years. This is the natural result from a decrease in the infectious material which is ordinarily deposited in pastures where no vaccination is practised. The fewer cases of blackleg, the less opportunity for reinfecting the ground.

About 1890 or 1891 Professor Kitt published the results of a series of experiments which he had undertaken for the purpose of producing a vaccine which would confer absolute immunity in a single inoculation and still be considered safe. Although the grand total of vaccinations up to that time was extremely satisfactory, there were several instances recorded where a high percentage of individual herds had died as a direct result of the vaccination. The statistics also indicated that a certain number of the vaccinated animals failed to become immunised, and died later from spontaneous blackleg (0·37 per cent.). The new vaccine prepared by Kitt had been exposed to streaming steam of a temperature 98 degrees to 102 degrees C. for about six hours, at the end of which time the virulent pulverised meat was sufficiently attenuated to be inoculated in comparatively large doses into guinea-pigs, sheep, and calves without fatal result, while producing a high degree of immunity. The preparation of this vaccine is very simple, but the product varies considerably in strength, and before being used in practice it is necessary thoroughly to test it on a number of sheep. Guinea-pigs are very unreliable for this purpose, and cattle are not easily obtained for such experiments in sufficiently large numbers.

This vaccine, known as Kitt's dry vaccine (to distinguish it from a fluid vaccine which he prepared later), was extensively used in many countries in Europe, and according to statistics published in 1893 the results obtained with

it were better than those obtained by double vaccination on the tail, and nearly as good as from double vaccination on the shoulder with Arloing's vaccine. The question remaining was, therefore, whether a single or a double vaccination was to be preferred. Although he was the originator of the single-vaccination method, Professor Kitt did not claim it to be superior to Arloing's method, as repeated inoculations necessarily must re-enforce the power of resistance; but he thinks that the same degree of immunity can be obtained with a single inoculation with his dry vaccine as with a double vaccination with the French vaccine. More recently Professor Kitt has prepared a vaccine from pure cultures of the blackleg bacillus; but, as will be seen from the table below, its protective value was comparatively low, and consequently it was never used very extensively.

At the International Veterinary Congress in Berne, Switzerland, in 1895, Professor Strebel published the total results from vaccination for blackleg, compiling all the statistics which he had been able to obtain. They cover the period from 1884 to 1895, and embrace the various methods of inoculation already mentioned.

METHODS OF VACCINATION, TOTAL NUMBER VACCINATED, AND ACCIDENTS AFTER VACCINATIONS IN EUROPE.

Method of Vaccination.	Number of Animals Vaccinated.	Accidents.					
		Deaths from Vaccination.	Deaths per Thousand.	Deaths from Natural Blackleg after Vaccination.	Deaths (per cent.)	Combined Losses.	Per Cent.
Double vaccination on the tail	325,893	188	0·56	1,245	0·38	1,433	0·44
Total vaccinations in shoulder region ...	91,066	77	0·84	365	0·40	441	0·48
Double vaccination in shoulder region ...	37,410	8	0·22	157	0·42	165	0·44
Single vaccination with Kitt's dry vaccine	39,084	61	1·56	187	0·48	248	0·63
Single vaccination with Kitt's pure-culture vaccine	5,643	8	1·41	81	1·43	89	1·58
Total	499,096	341	0·68	2,035	0·40	2,376	0·47

The total shows that nearly half-a-million head of cattle were vaccinated, and that the loss resulting from the operation, together with the number of deaths from blackleg contracted naturally subsequent to inoculation, amounts to less than one-half of 1 per cent. In order fully to appreciate the protective value of the vaccine, it is necessary to compare the mortality among vaccinated animals with that of unvaccinated ones under the same circumstances. To this end Strebel furnishes the following figures: Of the cattle treated with double vaccination on the tail, 129,705 were pastured together with 245,560 head of unvaccinated stock. Of the former 550 head, or 0·42 per cent., died from spontaneous blackleg, while 4,136 head, or 1·76 per cent., of the latter died from blackleg. The mortality among the unvaccinated animals was consequently four and one-half times greater than among those vaccinated.

Of the cattle vaccinated in the shoulder region 62,158 were pastured with 82,334 head of unvaccinated cattle. The respective losses from blackleg amounted to 282 head, or 0·45 per cent., in the former, and 1,350 head, or 1·64, in the latter. Mortality among unvaccinated was three and three-fifths times greater than among those vaccinated. Of the animals which received a double inoculation in the shoulder region 25,849 were pastured with 13,452 unvaccinated animals. Of the former 119 head, or 0·46 per cent., and of the latter 321 head, or 2·38 per cent., died from blackleg; difference in mortality five times greater among unvaccinated stock. Of the animals treated with Kitt's single vaccine 30,123 were pastured with 57,867 unvaccinated cattle. Eighty-five head, or 0·28 per cent., of the former died from blackleg, while the loss among the latter was 921 head, or 1·59 per cent., or nearly six times greater.

The results from Kitt's pure-culture vaccine show a loss of 1·58 per cent. among the vaccinated animals, while the loss among 13,183 unvaccinated cattle in the same pasture amounted to only 1·45 per cent.

It appears from these statistics that vaccination in the shoulder region is not quite so safe as vaccination on the tail, especially when the inoculation accidents are included; while, on the other hand, the single vaccination on the shoulder with Kitt's dry vaccine confers the highest degree of immunity. His pure-culture vaccine, however, was very unsatisfactory.

In 1896 M. Strebel stated that the percentage of inoculation accidents had increased during the previous year from 0·028 per cent. to 0·724 per cent., or twenty-two times higher than the record for eleven years. This he attributed to a less attenuated vaccine which, at his own request had been prepared by Arloing and Cornevin. The unfortunate results caused the Swiss Government to order an investigation for the purpose of determining the best preparation for blackleg vaccine. A double vaccine was prepared at the Veterinary College in Berne, while the laboratories at Lyons furnished an equal amount of their double vaccine for comparision Of the 4,202 vaccinations not less than 123 animals died from inoculations for blackleg, by far the greatest percentage falling on the Berne vaccine, and especially on animals which had been vaccinated in the shoulder region. As a result of these experiments, the Swiss authorities again abandoned the latter method and returned to the slow and cumbersome inoculations on the tail.

The Bureau Vaccine.—As already stated, experiments were begun in the Pathological Laboratory of the Bureau of Animal Industry in the fall of 1896 for the purpose of preparing a blackleg vaccine which by a single inoculation would produce practical immunity and still be sufficiently attenuated to cause only a minimum amount of loss at the time of inoculation. All the various methods already mentioned were tried, and it was finally decided to adopt Arloing's principle with Kitt's modifications. The finely ground and sifted blackleg meat was heated in moist condition for six hours at a temperature of 93 degrees or 94 degrees C., and the dried crust pulverised and divided in packets containing ten to twenty-five doses each. It was found that heating to 90 degrees C. for six hours, as recommended by Kitt, did not attenuate sufficiently to make the vaccine safe in all instances. The same was the case with virus heated at 91 degrees and 92 degrees C.

To ensure absolute uniformity of temperature, a special oven provided with a 3-inch oil jacket was constructed, and the vaccine produced gave, so far as could be ascertained by numerous inoculations, such uniformly good results that it was decided to place a limited number of doses in the hands of reliable stockmen in order to have them test it in practice on their cattle.

TABLE SHOWING FOR EIGHT STATES THE NUMBER OF CATTLE VACCINATED, AND THE PERCENTAGE OF LOSS BEFORE AND AFTER VACCINATION.

State.	Number of Reports.	Number of Cattle Vaccinated.	Average Annual Loss from Blackleg.	Deaths same Season, but Previous to Vaccination		Died after Vaccination.					
						Within 48 hours.	From 3 to 7 days after.	Within 1 Year.	Number of Cases Admitted to be due to Mistakes.	Total Number.	Per Cent.
			Per cent	No.	Per cent						
Texas	164	50,609	13	1,162	2·95	20	7	141	59	227	0·45
Nebraska	71	20,893	17·2	796	3·80	7	1	39	5	52	0·25
Kansas	140	19,508	11	919	4·76	36	24	52	3	115	0·58
Colorado	53	12,609	12·8	230	1·83	6	8 (?)	120 (?)	4	138	1·09
Oklahoma	37	7,915	17·5	471	5·96	2	...	20	15	37	0·47
Indian Territory ...	20	7,418	17·5	504	7·81	...	...	51	44	95	1·28
North Dakota ...	22	6,118	12·75	133	2·18	...	...	25	...	25	0·41
South Dakota ...	15	2,299	12·75	74	3·32	1	1	7	2	11	0·48
Total ...	522	127,369	14	4,589	3·63	72	41	455	132	700	0·54

These figures, as will be seen, are based upon the reports received from 522 stockowners who vaccinated about 127,000 head of cattle. The average loss from blackleg in these eight States and Territories was estimated in the reports to be 1·4 per cent. This percentage, as already stated, is based upon the losses sustained in well-known blackleg districts and not upon the total number of cattle in each State, and refer, of course, to unvaccinated herds. At least 90 per cent. of the 522 stockowners lost cattle from blackleg previous to vaccination, and the actual number of deaths reported to have occurred during the same season before the cattle were vaccinated amounts to 4,589 head, or 3·60 per cent.

After vaccination 700 head died. These may be classified as follows:—72 head died within forty-eight hours after vaccination, and cannot justly be charged to the effect of the vaccine. In every one of these cases the owner reported that he was losing cattle every day before vaccination; and the period of incubation for blackleg being from two to five days, it is reasonable to assume that these animals were infected before being treated. Consequently they should be left out of consideration in judging the effect of the vaccine. Forty-one head died in from three to seven days after vaccination. It would doubtless be safe to consider these cases as being due to the immediate effect of the vaccine, and to term them cases of inoculation-blackleg.

During the year following vaccination 587 head died from blackleg. In 132 of these cases the owners admit to having made one or more mistakes, either in the preparation of the vaccine or in injecting it. A number also state that the animals which died were under five to six months old when vaccinated, some being only two to four months old. Mistakes are no doubt also responsible for some of the 455 deaths, but only in cases where the owners expressly state that such occurred have the deaths been classified in the column headed "Mistakes." Take, for instance, the large number of deaths reported from Colorado—138 cases. Only 4 of them are acknowledged to be due to mistakes, while 6 died within two days after vaccination Of the remaining 128 cases, 52 head, or nearly half, were lost by one man who vaccinated 1,700 head. In reply to question 18 on the inquiry blank, this man states that he used Pasteur vaccine the year previous with the same result. This is an equal loss of 3 per cent. with either single or double vaccine, and indicates that either some abnormal conditions obtain in that neighbourhood or else the same mistake in using the vaccine was made in both cases.

Another stockowner in Colorado, who vaccinated 600 head, says that he lost 17 from blackleg three months after vaccination. Evidently the number of cattle failed to become immune from the vaccination. He states, however, that in withdrawing the syringe after making the injection a part of the fluid escaped. This cannot occur when the directions are followed, and, as no complaints were received from any of the other stockowners who obtained vaccine from the same lot, the writer is inclined to believe that the unsatisfactory result cannot be charged against the vaccine. A third stockowner vaccinated 2,350 head and lost 24 head during the following winter. In reply to question 18, he states that he has also used the Pasteur vaccine, and that the subsequent loss among the vaccinated ones was equally as great as among those which had not been vaccinated at all. These three cases account for 93 of the 128 deaths, leaving but 35 deaths among the remaining 7,959 vaccinated animals, or 0·44 per cent.

The Indian Territory also figures in the table with a very high percentage of deaths which occurred several weeks after vaccination. Of the 95 which died, 40 belonged to one man, who states that he lost a quantity of vaccine by working in "too much of a rush."

[The importance to stockowners of the subject dealt with above cannot be overrated; and Mr. Quinnell, who handed us the article on Blackleg, which is taken from the *Veterinary Journal*, has consequently omitted his usual monthly article on "Diseases of the Horse."—Ed. *Q.A.J.*]

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1899.											1900.	
	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.
North.													
Bowen	14·90	8·61	9·16	1·46	Nil	0·63	0·21	0·06	0·56	Nil	2·92	7·61	0·40
Cairns	10·97	35·16	12·97	4·03	0·63	2·01	1·31	3·23	0·74	0·33	4·57	43·06	1·98
Geraldton	19·49	41·28	40·65	12·61	1·64	8·93	2·85	9·03	1·03	Nil	4·89	62·26	2·36
Gindie	...	...	...	...	...	...	...	...	...	...	...	...	0·57
Herberton	4·93	21·32	6·74	1·49	0·66	0·23	0·36	1·62	0·18	2·75	0·73	11·90	0·23
Hughenden	1·60	2·99	0·10	0·01	0·20	0·16	2·05	Nil	0·45	1·05	0·33	6·43	1·04
Kamerunga	...	...	...	...	...	....	...	...	...	...	...	...	1·01
Longreach	2·20	4·05	0·54	0·58	0·60	1·08	0·28	0·06	0·27	0·67	Nil	1·68	0·48
Lucinda	20·96	20·05	14·60	1·71	0·40	2·78	0·80	0·97	0·02	1·26	1·02	37·35	1·71
Mackay	9·60	18·65	9·19	4·74	Nil	2·29	2·37	1·33	0·19	0·19	7·65	20·86	0·65
Rockhampton	9·88	3·59	4·42	2·49	0·40	2·23	1·71	1·96	2·35	1·22	11·02	4·53	0·25
Townsville	10·69	10·93	3·76	0·59	Nil	0·78	0·89	0·01	0·35	0·16	0·53	21·09	0·07
South.													
Barcaldine	2·69	2·33	1·17	0·39	0·05	1·03	0·53	0·27	0·94	0·52	0·04	3·08	0·65
Beenleigh	2·32	0·76	4·26	3·06	5·70	6·93	2·02	3·11	2·53	1·80	7·40	5·42	3·19
Biggenden	...	...	...	...	...	...	...	...	...	...	...	...	0·40
Blackall	3·49	2·74	0·18	0·13	0·20	1·11	0·57	0·16	1·20	0·04	0·85	1·73	1·31
Brisbane	2·10	0·71	3·32	1·54	2·75	3·50	1·43	2·48	2·26	2·33	7·61	6·51	5·18
Bundaberg	7·26	3·76	4·13	2·92	1·12	2·33	2·62	1·67	1·60	0·06	7·62	4·63	0·86
Caboolture	2·66	1·10	3·85	2·06	2·67	4·61	1·90	2·10	2·30	2·23	7·14	3·01	1·18
Charleville	1·20	0·51	0·52	0·06	0·25	0·33	1·26	0·55	0·36	0·43	0·16	1·01	0·08
Dalby	1·94	0·57	2·79	1·20	1·33	1·67	1·09	1·20	1·44	1·84	2·89	0·41	6·31
Emerald	2·99	3·00	2·60	2·43	0·03	1·31	2·08	1·96	1·93	1·32	0·40	3·08	1·22
Esk	1·57	0·91	4·11	1·89	2·40	2·59	1·69	2·79	2·67	2·25	5·31	1·12	2·34
Gatton College ...	1·93	0·21	3·32	1·33	1·18	2·01	1·55	2·19	2·13	3·50	5·87	2·40	4·07
Gayndah	1·45	1·01	1·45	1·26	1·30	0·86	3·34	1·24	2·73	4·59	7·37	2·52	2·07
Gympie	2·12	2·88	4·01	2·89	3·57	2·26	1·23	2·11	2·41	0·39	6·41	5·59	1·84
Ipswich	1·24	0·24	4·11	1·41	1·82	2·12	1·29	2·77	2·04	3·16	4·66	2·79	1·66
Laidley	2·35	0·54	3·66	1·63	1·32	2·00	1·82	5·04	3·17	2·40	6·50	0·64	3·15
Maryborough	5·87	5·91	4·59	3·35	4·20	1·71	1·49	2·29	1·20	0·51	4·13	4·88	1·78
Nambour	6·26	6·87	5·32	3·79	6·17	4·18	1·81	3·13	2·87	3·03	11·11	4·07	5·64
Nerang	3·44	1·92	5·36	2·28	3·34	9·80	2·52	4·74	1·99	1·42	6·31	4·60	3·37
Roma	3·28	0·63	1·70	0·26	0·53	1·05	1·00	0·55	0·35	1·27	0·99	0·43	1·52
Stanthorpe	2·88	0·43	2·53	1·20	1·36	3·11	1·08	1·63	1·36	0·86	3·22	2·62	4·81
Taroom	2·01	2·89	3·52	1·35	0·61	1·27	1·60	1·55	0·83	3·32	0·65	1·78	3·65
Tambo	2·81	1·52	0·52	0·15	0·60	1·16	0·74	0·27	0·79	0·08	0·66	2·28	1·55
Tewantin	10·08	7·36	8·66	6·87	9·28	5·00	3·67	2·80	3·36	0·46	8·22	1·69	4·87
Texas	3·52	0·13	2·37	0·50	3·26	2·95	1·38	1·72	0·97	0·74	2·67	1·56	3·39
Toowoomba	2·10	0·80	3·68	1·33	2·11	1·75	1·63	3·15	1·43	2·36	4·75	1·01	2·90
Warwick	3·19	1·16	4·13	1·03	1·53	2·44	1·00	1·99	2·48	1·67	3·83	1·84	4·19
Westbrook	...	...	...	...	...	...	...	...	...	...	...	...	3·71

QUEENSLAND PRODUCTS IN BRITISH MARKETS.

LATEST WHOLESALE PRICES.

BUTTER.—Choicest Australian, 96s. to 98s.; finest, 92s. to 94s.; choicest New Zealand, 96s. to 98s.; choicest Danish, 108s. to 110s. per cwt.

CHEESE.—New Zealand choicest, 60s. to 62s. per cwt.; American, 47s. to 61s. Prices will inevitably advance owing to short supplies and increased consumption.

SUGAR.—£15 to £15 10s. per ton; Java, £9 15s. to £10 10s. per ton; German beet, 88 per cent., 9s. 9d. per cwt.

SYRUPS.—4s. 9d. to 11s. per cwt.

MOLASSES.—5s. to 6s. per cwt.; Queensland, none.

RICE.—Patna, 12s. 6d. to 13s.; Java, 15s. to 17s. per cwt.

COFFEE.—Finest Coorg peaberry, 65s. to 89s. per cwt.; Ceylon plantation, 103s. to 108s. per cwt.; bold blue, 103s. to 108s.; Santos, 38s. 6d. to 41s.; Long berry Mocha, 106s.

ARROWROOT.—6½d. to 7½d. per lb.; Bermuda, 1s. 9d. to 2s. per lb. Dull of sale.

WHEAT.—28s. 6d. to 30s. per quarter; 3s. 7d. to 3s. 9d. per bushel. Quiet sales at full prices. Victorian, 31s.

GINGER.—Calicut, rough, 26s. to 34s. per cwt.; Medium new crop, 70s. to 90s. Jamaica: Ordinary, 51s. to 58s.

TOBACCO.—Prices for pipe tobacco on 1st February, 1900—Pipe tobacco:—Kentucky Leaf: Common to fair, 2½d. to 5½d.; coloury, good to fine, 7d. to 9d. Kentucky Strips: Common to good, 3½d. to 7½d.; fine, 8d. to 11d. Virginia Leaf: Common to fair, 2½d. to 6d.; coloury, good to fine, 8d. to 11d. Virginia Strips: Common to good, 4d. to 8d.; fine, 8d. to 12d. Cigar—Sumatra, 7d. to 5s.; Manila, 4d. to 4s.; Havana, 8d. to 5s.

WINE.—Fair red wine (Australian claret type) in bond, 2s. to 2s. 6d. per gallon; fine old quality, 4s. 6d. per gallon; ordinary London port, £10 per pipe of 110 gallons; Marsala, £12 per pipe of 96 gallons.

GREEN FRUIT.—Apples: Tasmanian, 11s. to 13s. 6d.; Victorian, 11s. to 13s. 6d. per case. Pears, 8s. to 12s. per case. Pineapples, 1s. 6d. to 2s. 6d. each. Oranges: 10s. to 13s.; selected, 16s. to 28s.; others, 16s. to 28s. per box; prices advancing. Grapes: Almeria, 20s. per barrel; English, 2s. per lb.; rising.

EGGS.—Australian, 9s. 6d. to 10s. per 120; Irish, 11s. to 12s. per 120; Danish, none offering, 11s. 6d. to 13s. per 120; French, 9s. to 10s.

HONEY.—British, 45s. per cwt.; colonial, 30s. per cwt.

OLIVE OIL.—£33 to £36 10s. per tun (252 gallons). Eating Oil, 50s. to 65s.

TIMBER.—Kauri pine is selling steadily at late rates. Fair business in cedar logs. General advance in values, except for New Zealand white pine, which is in moderate demand.

SISAL HEMP.—£18 to £30 per ton.

WOOL.—The New Zealand Loan and Mercantile Agency Company report:—The sales progress firmly. The American demand has increased. Crossbred market firmer. For superior greasy merino the prices are now on a level with closing rates of last sales.

FROZEN MEAT.—The latest quotations to the 12th April for the various descriptions of frozen meat are:—New Zealand mutton (crossbred wethers and maiden ewes): Canterbury, 3⅝d.; Dunedin and Southland, 3½d.; North Island, 3⅜d. Australian mutton (crossbred and merino wethers): Heavy (over 50 lb.), 3⅜d.; light (under 50 lb.), 3½d. River Plate mutton (crossbred and merino wethers): Heavy, 3⅛d.; light, 3½d. New Zealand lambs: Prime Canterbury (32 lb. to 42 lb.), 4⅞d.; fair average, 4⅝d. Australian lambs: Prime, 4⅛d.; fair average, 3½d. Australian frozen beef: Fair average quality ox forequarters, (160 lb. to 200 lb.), 2⅞d.; hindquarters, 3⅛d. New Zealand frozen beef: Fair average quality ox forequarters (160 lb. to 200 lb.), 2⅞d.; hindquarters (180 lb. to 220 lb.), 3⅝d. The above prices are the official quotations furnished by the Frozen Meat Trade Association. The basis of quotations is sales of lines of not less than 100 carcasses of mutton or lamb, or 25 quarters of beef. All the

quotations for mutton are for average quality. Quotations for New Zealand and Australian lambs do not include sales of small lambs, or heavies, or inferior quality.

Bacon.—44s. to 60s. per cwt. for lean sizeable; fat stout, 50s. to 57s. per cwt.

Hams.—Canadian, 40s. to 50s. per cwt. Irish (smoked): Special brands, 76s. to 84s.; fine, 74s. to 86s.

Hides.—Queensland bullock, heavy (52⅝ lb.), 5⅞d. to 6d. per lb.; medium (47⅜ lb.), 5⅝d. to 5¾d.; cow (41⅜ lb.), 5d. to 5⅛d.; New South Wales light bullock, 5⅛d. per lb.; horse, 7s. to 9s. each. Sales on 15th March show an advance of 1d. per lb. on heavy and light bullocks, and ⅞d. per lb. on cow hides.

Skins.—Sheep: Fine Tasmanian, 11¾d. per lb.; Melbourne, 11¼d. per lb.; Adelaide, 10¾d. per lb.; short and shorn, 4½d. to 8½d. per lb.

Furred Skins.—*Kangaroo*, 1s. 11d. to 2s. 2d. per lb. *Opossum*, 5d. to 1s. 1¾d.; Tasmanian, 3s. 6d. to 6s. 9d. per dozen. *Wallaroo*, 1s. 9d. per lb. *Wallaby*, 1s. 4d. to 1s. 7d. per lb.; prices declined by 15 per cent. in March. *Bear*, 7d. to 9¾d. each; prices for all but the best skins close considerably lower (fully 35 per cent).

Tallow.—On 12th April, mutton tallow, fine, brought 30s. 6d. per cwt.; medium, 29s. 6d.; beef, fine, 29s. 3d. to 30s.; medium, 26s. per cwt.

Horns.—Extra large, 52s. to 60s.; large, 40s. to 47s. 6d.; medium, 25s. to 35s.; small, 12s. 6d. to 20s. per 100.

Bones.—Shanks, round, £6 to £7 10s.; flat, £3 17s. 6d. to £4 5s.; mixed, £4 5s. to £4 10s. per ton.

PRODUCTION OF OLIVE OIL.

Referring to correspondence between the Minister for Agriculture of South Australia and the officer in charge of H.M. Naval Stores in Sydney, in regard to the supply of olive oil for use of the British fleet in Australian waters, the *Journal of Agriculture* (S.A.) says:—

What is required is oil of a quality suitable for lubricating purposes, for which there is a very large demand, the annual consumption by the Australian station for navy purposes being about 10,000 gallons. The oil needed would require to be sold at Sydney at about 3s. per gallon. Up to the present nothing lower than second-class olive oil has been produced in South Australia, and all this is fit for medicinal and food purposes, and meets with a ready sale both locally and for export. In other countries, where the output is large, and the factories produce large quantities of oil, a low-grade oil for lubricating purposes is obtained, we believe, by distillation after the firsts oil has been expressed from the pulp. All our South Australian factories are too small to take up this matter individually; but it is a question whether it would not be profitable, in view of the fact that there is a certain market for the oil close at hand, for the various manufacturers to combine to erect the necesssary works for the purpose. The production of olive oil in South Australia amounts to from 5,000 gallons to 7,000 gallons annually, all of which is readily disposed of. About 800 acres in all are planted with olives; but there has been very little increase in the area during the past few years. In view of the immense value of the olive in the other countries, it is difficult to understand why, in a climate so suitable, they have not been largely planted in this colony, especially as the local production, even in a good season, is not sufficient to meet the demands for it. Last season the olive crop was very good; but, as usually happens here, the coming season does not promise to be anything like so good.

General Notes.

ARTIFICIAL MANURES.

THE many experiments carried out by the various agricultural teachers and professors all have lessons of usefulness, but perhaps the most directly useful are those which have for their object the economical application of artificial manures, especially to root crops. The latest contribution to that matter is from Mr. Bernard, North Wales, Instructor of Agriculture, Stafford. In a trial of various dressings for growing mangolds, the best results were obtained from 4 cwt. of nitrate of soda, 3 cwt. of superphosphate, and 4 cwt. of kainit, at a cost of £2 19s. 10d. per acre, which gave an increase of 8 tons over the unmanured plot. Where the superphosphate was increased to 5 cwt. the yield was slightly better; where the nitrate was reduced to 2 cwt. the yield was 3 tons less; where reduced to 1 cwt. the crop was 4½ tons less. The omission of kainit reduced the yield 5½ tons, and the omission of superphosphate 3 tons less. It is an old saying—viz., that it is only by supplying a little of everything that good results can be secured, and that the excessive use of artificials is an absolute waste.—*Scottish Farmer.*

RUBBER-TREES.

The United States Department of Agriculture has recently issued some valuable information on the subject of rubber-trees. Experiments in India with certain species were not successful, owing to the fact that the trees did not develop the characteristic lacteal ducts. In the light of the work of the department's experts, this was due to error in selecting the variety. Unless care be taken in this direction, failure will result in securing rubber, even though the trees may apparently grow well. There are four varieties of rubber-trees, which must be utilised according to the soil and climate of the place of cultivation:—

1. *Castilloa elastica* grows well and produces rubber in places where the climate is hot, humid, and the soil drained.
2. *Hevea brasiliensis*, if the climate be hot, humid, and the soil swampy or covered with water.
3. *Manihot Glaziovii*, the Ceara plant, if the climate is hot and the soil dry, sandy, or stony.
4. *Sapium biglandulosum*, in temperate or cold climates, such as Florida, Louisiana, &c.

The last variety is especially suitable for growing on coffee plantations.

LARGE TREES.

THE largest tree in the world is to be seen at Mascali, near the foot of Mount Etna, and it is called "the Chestnut-tree of a Hundred Horses." Its name rose from the report that Queen Jane of Aragon, with her principal nobility, took refuge from a violent storm under its branches. The trunk is 204 feet in circumference. The largest tree in the United States, it is said, stands near Bear Creek, on the north fork of the Tule River, in California. It measures 140 feet in circumference. The giant redwood-tree in Nevada is 119 feet in circumference.

TREES AND WATER.

AN oak-tree of the average size, with 700,000 leaves, lifts from the earth into the air about 123 tons of water during the five months it is in leaf.

TESTING WOOL.

A homely recipe for testing when wool is dry enough to shear is to put four nails (3 inches) into a board for legs, and place a bit of tin about 6 inches square on top, making a miniature table. Put a lighted candle underneath till the tin gets hot (not red hot). Then put a lock of wool on top, and hold a mirror about 3 inches above the wool. If the wool is wet a moisture will appear on the glass; if very slight or none, the sheep are fit to shear.

TREATMENT OF WORMS IN DOMESTIC ANIMALS.

Mr. D. Hutcheon, M.R.C.V.S., Chief Colonial Veterinary Surgeon in Cape Colony, says, in reference to Cooper's dip:—

Cooper's dip, or a compound of arsenic, has established itself in the confidence of the farmers of the colony as an effective remedy for the expulsion of tapeworms in lambs and kids, and many have used it with equal success in calves and also in ostriches, although an occasional mishap may occur from want of care in measuring the dose carefully.

A teaspoonful of Cooper's powder contains the dose generally given to ten young sheep, which is practically 3 grains of arsenic each; a full-grown sheep may get 4 grains. A tablespoonful would be four teaspoonfuls, or, roughly, 120 grains of arsenic, sufficient for forty sheep; two tablespoonfuls, 240 grains, sufficient for eighty sheep; and if that amount is dissolved in 2 gallons of water, which is 160 oz., that would make each dose for a young sheep 2 fluid ounces, or a wine-glassful. Lambs under three months should only get half that quantity; three wine-glassfuls of such a mixture would be a sufficient dose for a horse. Experience shows that calves under three months old should not get more than the dose given to a young sheep, and when only one month old no more than is given to a lamb.

I may just remark that when this powder is mixed with salt and given dry in the mouth there is ordinarily a proportion of it wasted, hence the dose is not so certain. On this account many farmers give Cooper's powder alone unmixed with salt. The dose is carefully calculated, which can easily be done by dividing a teaspoonful into ten equal portions and observing the amount of the dose when placed on the point of a broad blunt pocket knife. The dose is taken up on the point of the knife, a boy opens the sheep's mouth, the knife is inserted into the mouth, turned over, and the powder left on the back of the tongue. For lambs and kids this is much the simplest plan, and if they have been well fasted before they may be allowed to go direct to their mothers to wash the powder down. I am of opinion, however, that when the powder is given for tapeworms to older sheep, which have always a certain amount of food in their stomachs, it is more effective when given in solution.

A NEW USE FOR DRIED APPLES.

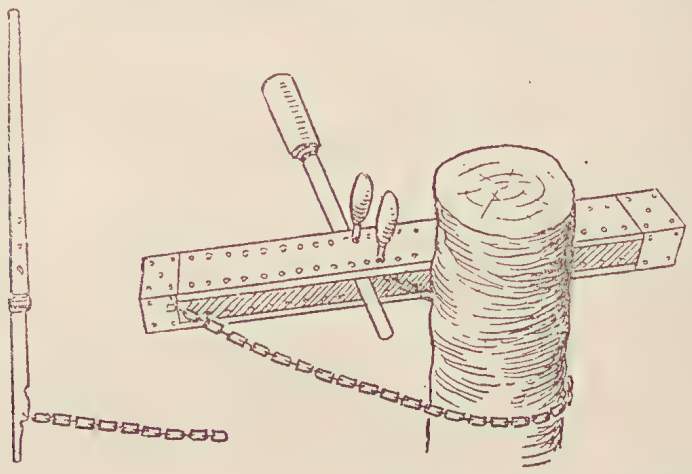
Some Frenchmen, it is said, with an eye to improving the morals of their countrymen, have been in search of some beverage which might take the place in popular favour of absinthe and other strong and dangerous drinks now in use. They have found it at last in "piquette," a sparkling, fruity beverage, composed of dried apples, raisins, and water. This combination is allowed to stand until fermentation takes place, and is then bottled, with the addition of a little sugar, or served directly from the cask. Piquette is not only good, but is very cheap, and it cheers but does not inebriate, unless taken in inordinately large quantities. In 1898, 50,000,000 gallons of this new drink were consumed in France. It is quite as palatable as cider, it is said, while it never reaches a condition when its use would not be allowable even by teetotallers in a teetotal community. The recipe for piquette is as follows: 5 lb. of raisins, 5 lb. of dried apples, and 5 gallons of water. Put in an open cask and let stand three days. Bottle with a half-teaspoonful of sugar and a bit of cinnamon in each bottle.

CLEANING LAMP WICKS.

A SMOKY lamp is often the result of a dirty and clogged wick. Steep the wick in a little strong washing soda and hot water. Then dry thoroughly, and the lamp will burn much better.

A POWERFUL LOG JACK.

THE subjoined illustration shows a log jack that any ingenious farmer may make. It consists of two hardwood planks nailed neatly close together. Holes are then drilled through the two, into which two cross pegs should slide easily. A



lever of hard tough wood or of iron is then required, with a short chain and hook. A chain is then hooked to the top of the plank, passed under the log to be raised, and hooked again to the chain on the lever. The latter is then hooked similar to a pump handle. It is a very simple device.

TOBACCO-GROWING IN IRELAND.

AN English journal says that experiments in tobacco-growing have been conducted during the past two seasons by the Donaghpatrick Co-operative Agricultural Society, County Meath, one of the societies established by the Irish Agricultural Organisation Society. They go to show that tobacco will grow luxuriantly in Ireland. The variety grown was "English Virginian." The tobacco was manufactured by Messrs. Goodbody, of Tullamore, 35 lb. of leaf producing 33 lb. of plug and flake tobacco. No flavouring was added during the manufacturing process, and the result was a fairly good sample of strong, coarse tobacco, containing an abnormal percentage of moisture, and also of nicotine. This Irish sample is nearly twice as strong as the strongest tobacco sold. The cost of production, including manufacture, was 4d. per lb., and the excise duty 2s. 8d. per lb. At the lowest estimate, the tobacco sells wholesale at 4s. per lb , yielding a net profit of £132 per acre. The Donaghpatrick Society proposes to continue its tobacco-growing experiments this year, only with a finer quality, and it is also intended to carry out similar experiments this year (1900) only with a finer quality, and experiments will also be made on the experiment farms of other societies in different parts of Ireland.

PRODUCE FOR SOUTH AFRICA.

THE southern colonies appear to find a good market in South Africa for their surplus hay and oats. During last month two steamers—the "Romford" and "Aldershot"—took over 19,749 four-bushel bags, 36,264 two-bushel and 12,278 one-bushel bags of oats, and 10,642 bales of hay. The smaller bags are designed for ease of shipment and especially for rapid transit on arrival at the Cape.

TIMBER FROM THE UNITED STATES.

The ship "Shenandoah," which left San Francisco on the 15th March last, brought 1,500,000 feet of timber to Sydney, in addition to 3,000 tons of general cargo.

DANISH EXPORT METHODS.

Considering the limited agricultural resources of their country, the Danes have developed a wonderful export trade in some of the products of the farm. The secret of their success lies chiefly in the great pains they take to cater to the particular requirements of the foreign consumer and the care they exercise to maintain the uniformly high standard of their products. Not only is every precaution taken to prevent the exportation of an inferior or damaged article, but sufficient attention is always devoted to the packing and the methods of shipment to insure the arrival in good condition of the articles exported. By years of faithful adherence to such a policy, the Danes have built up for their products a reputation that gives them a great advantage in the British market, where their export trade is chiefly centred.

TO BANISH COCKROACHES.

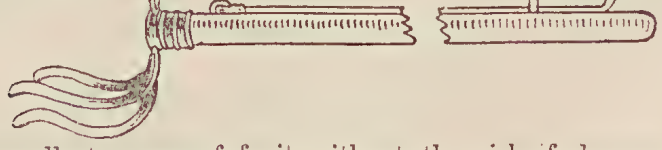
It is said that naphthaline is detested by cockroaches. Therefore a suggested remedy for the pest is to spend a few pence on some cakes of naphthaline, and place them either whole or broken in pieces in the places infested by these pestiferous insects. They will all disappear. This is vouched for by a Jamaican resident.

THE FARMER WHO HAS NO TIME TO READ.

At the Kansas Experiment Station, the question was put to the patrons of the Meriden Creamery: "What farm or dairy paper do you take?" Out of seventy-five patrons who answered the question, fifty-three took no farm or dairy paper. In looking up the details of the records of the patrons, it was interesting to note that the highest yield was made by a man who takes both dairy and farm papers. The man with a "farm paper" was getting from 60 dollars to 80 dollars' worth of dairy products from one cow, while the man who had no time to read was getting from 20 dollars to 30 dollars. Secretary Coburn, of Kansas, very well said: "Muscle, to win, must be lubricated with brains."—*Hoard's Dairyman.*

A FRUIT GATHERER.

Fruit intended for the market requires to be gathered with care. When fruit falls to the ground, or is knocked in the course of picking it, it becomes bruised, and decays far more rapidly than the sound article. Owners of orchards are always chary of letting inexperienced hands gather their stock, and, as a consequence, expense and delay is often entailed. By the adoption of a device such as is shown in the accompanying illustration, anyone, from a mere child



upwards, may collect a crop of fruit without the risk of damage. The steel fingers of the gatherer are either rag-covered or coated with rubber, and when the instrument is pushed up among the foliage of the tree, and the claws have surrounded the particular apple, pear, or plum desired, it is only necessary to push up the curved handle to make the claws contract round the fruit. Slight pressure then disengages the fruit from the stem, and it is withdrawn without the least damage.

FROGS AS FOOD.

As an article of diet, frogs do not commend themselves to Englishmen generally. Australians, in particular, are averse to eating many animals which are common articles of food in Europe and America, and of which many are esteemed great delicacies. We will enumerate a few of these, to show that in many cases the only objection to their employment in the kitchen is—prejudice.

Hares are numerous in Queensland; but how many bushmen would care to dine off roast hare or stewed rabbit? Yet these are regularly served up under various forms in British homes. Eels come under the same ban; yet stewed eels, eel pies, and pickled eels find favour in all European countries, in the same way as the terrapin is favoured as a delicacy in the United States of America. Iguana is never eaten by Australians; yet we have partaken with much pleasure of iguana stewed and curried. In the Southern States of America and in South America the iguana is a regular article of diet. Certainly our Australian reptile is not an iguana at all—merely a gigantic lizard; but its flesh is white, delicate, and tender. It may be objected that this reptile is a dirty feeder; but so are pigs, ducks, and fowls; yet no one would object to roast pork, duck, or boiled fowl. Monkeys are commonly eaten in tropical countries, notwithstanding their hideous resemblance to what one would suppose a roast baby would look like. Take the land crabs of the West Indies. These crustaceans feed on any garbage they can find, and are most particularly fond of dead bodies; yet they are esteemed a delicacy there. Fish, such as jew fish, bream, flathead, and, generally, all river fish, except mullet, are filthy feeders, as every fisherman knows; so are crabs; but who objects to eating these animals? Many an old bushman has enjoyed a meal of the large white grubs which are found in the rotted sap of dead timber. Edible bird's nests, bêche-de-mer, oysters (he was a bold man who first ate an oyster), periwinkles, cockles, and a host of shell fish are all eaten by British-speaking people; and, judging by the quantities of prawns sold in Brisbane, these—the greatest scavengers of the rivers, the devourers of all the foul bodies of dead animals they find floating in the water—find great favour with all classes of the community. Frogs (*Rana esculenta*) are a delicacy which is quite unknown to the Australian palate (this particular batrachian never having been introduced here); yet millions of frogs are eaten in some parts of the Old and New Worlds. Our first experience of frogs was at St. Germain-en-Laye, near Paris. Dining at a restaurant there one day, a dish of appetising-looking patties, or rather fritters, made its appearance. The ladies of the party, who were all English tourists, tasted them and found them so delicious that the party soon demolished the dishful. On the waiter's reappearance he was asked what "bird" the patties contained. He smiled and replied that the birds were frogs—hindlegs of frogs. They were nicely cooked, and proved very delicate food. Snails, again, form an article of diet in large consumption on the Continent. They are a large variety, and are prepared for cooking whilst alive, being purged and cleaned, after which they are boiled, extracted from the shell, and chopped up finely with herbs and condiments; the shell is polished clean, and the prepared mincemeat is then put back into it and served up.

With respect to frogs, only the hindlegs are eaten, as there is no other flesh on the reptile. Our great green tree frog (*Hylus caerulea*) would furnish many a delicate dish if once it became recognised that hindleg of frog is one of the most delicate morsels in the world.

The United States Fish Commissioner recently issued an interesting report upon frog-farming. He says that the value of frogs as food is now thoroughly recognised, not only in France, but in America, the hindlegs only being usually served. The annual catch in the United States is now stated to be little less than 1,000,000 frogs, for which consumers are stated to pay about 150,000 dollars. This is equal to about 7½d. each. A considerable quantity is caught along the St. Lawrence River, but the industry is also carried on in the basins of the St. Francis and in Arkansas and Missouri, and the unrestricted hunting of

frogs threatens to practically exterminate them unless some means are taken to prevent it. The diminution of the natural supply has led to the establishment of frog farms, and the Commissioner goes into the details of breeding, feeding, and rearing of frogs. One of the difficulties is the supply of living food, and some use meat to attract flies and other insects. There is not much difficulty in getting them through the tadpole stage by protecting the pond from birds and other enemies, but the critical time comes when the legs are developed, the tail is absorbed, the gills give place to lungs, and the tadpole becomes a frog. It is stated that there is a frog farm in Ontario, where the waters are simply stocked with mature frogs, and the young allowed to take their natural course, yet some 5,000 lb. of frog legs are produced annually.

CANNING FRESH EGGS.

After many attempts, which resulted in whole or partial failure, it would appear that eggs have now been successfully canned. The process consists of opening the eggs, separating the albumen from the yolk, and placing them separately in the cases, in which they are then frozen. Thus treated, they will keep perfectly fresh until wanted; and fresh eggs for confectioners' use are obtainable all the year round. Many tons of frozen canned eggs are being sold to hotelkeepers, bakers, confectioners, pastrycooks, and others in New York; whilst the English market is also about to be supplied with them.

TRAPPING DINGOES.

An old trapper, interviewed by one of the staff of the *Sydney Morning Herald*, advises that, if a man intends to devote his time to the work, he should have at least fifty traps, to be set at various distances, according to the area of the country under his supervision and the abundance of the dogs and foxes. Before setting the traps, it is desirable that some sort of trail should be used. There are some patent preparations to be obtained for this purpose, but the essence of aniseed on a piece of rag or sheepskin, drawn by a cord along the ground by the party setting, is a good thing; or portion of the offal of sheep or cattle; or even the proverbial "red herring" will prove effective in drawing the dog or fox to the trap. In setting the trap, sufficient soil should be scraped away to allow the trap to lie in when set, so that the top of the trap is not higher than the ordinary level of the ground. Set the trap and lay it in this; then lay over the top a piece of stiff brown paper, and carefully and lightly sprinkle it all over with the soil removed from the hole, sufficiently to cover the whole of the paper and trap. It is not necessary or desirable to secure the trap in any way by chain or rope, as the dog or fox cannot go far with the trap dangling between his legs, and can always be tracked even if he does get away a few chains. By securing the trap there is a danger of the dog jumping about in his efforts to get loose, of dragging his leg through or breaking it off, and thus getting away. It is always better, if possible, to set the traps along or on some old track, or along a line of fence.

Dogs seem very fond of following up old tracks, and in the case of dog-proof fences they naturally run along, seeking for some place to get through. Care should be taken not to walk round about the trap more than can be helped, or to leave more tracks behind than can be avoided. It is a good plan if the party is on horseback to ride or lead the horse right over the spot where it is intended to place it, as the dogs will follow up the tracks of the horse and invariably run into the traps; also, when the trap is set and covered over the man should step across the trap for the same reason. If there are footmarks all round the trap, the dogs, being very cunning and suspicious, will also keep going round and round; therefore, obliterate all footmarks except those going directly over the trap. The trap should be inspected twice a week, and, unless set off, should not be disturbed. The trapper steps right over them in going his rounds of inspection. The object should be to set them in the places most

frequented or traversed by the dogs, to entice them to the trap by trails, and the surface above the trap made as natural as possible. There is great art and skill in setting a trap properly. When the dogs and foxes are caught, if the skins are of value, or if it is desired to preserve them from weevil or maggots, when taken home they should be painted over with a solution of arsenic and water, in similar manner to sheepskins.

HOME INDUSTRY.

PERFUMES of various sorts, geranium, patchouli, vetyver, ylang ylang, are made in Réunion; they are good in quality, but difficult to place on the European market in competition with known brands, but they all produce more or less profit, and the process is so simple that many ladies carry on the operations in their kitchens as an aid to household expenses.

A RECORD CARGO.

THE largest shipment of dairy produce ever sent from New Zealand was taken by the "Paparoa" lately. It consisted of 1,055 tons of butter and 363 tons of cheese. Of this, Wellington sent 711 tons butter and 179 tons cheese; Dunedin, 141 tons butter and 183 tons cheese; Auckland, 135 tons cheese; Lyttleton, 68 tons butter. Many hopes go with that cargo that it will fetch good prices in London.

A DOG EATING EGGS.

UNLESS the dog given to this pernicious habit be a valuable one, the best cure is to get rid of the animal either by shooting, poisoning, or presenting him to a friend in a neighbouring colony. A cure may, however, often be effected by compelling the dog to hold a boiling hot egg in its mouth, or by blowing the egg and filling it with chili pepper and croton oil. A very good plan is suggested in the *Farmer and Stockbreeder*—that is, to shut the animal up and give him nothing but doctored eggs. The dog this plan was tried on was naturally very hungry for several days, but he got nothing presented to him but these delusive eggs. He could never bear the sight of one afterwards, and when shown an egg would drop his tail between his legs. Another was cured by smearing over an egg with the yolk of another, in which some *dolichos pubes* had been mixed; this stuff fairly tickles anything to death, and isn't likely to be forgotten.

PROFITS IN FROZEN MEAT.

WHAT secret profits there must be in frozen meat (writes the London correspondent of the *New Zealand Farmer*)! At Smithfield recently I came across an instance where the holder of a "stall" merely had sold his goodwill. For what? No less a sum than £10,000, and then the buyer had probably to pay a rent of £10 a week for his standing. It may hardly be believed, but it is nevertheless true. I received the information from the very best authority. Yet we are told that all this is done on 2 per cent.

A NEW WHEAT.

IT is reported in southern journals that Mr. J. King, of Georgetown, has a new wheat, which he calls "Viking." He selected it three seasons ago (1896), and at the beginning of last season (1899) had 117 lb. This was sown on about $4\frac{1}{2}$ acres on 26th May, 1899, and from it he reaped, on 24th November, $70\frac{45}{60}$ bushels. He used 4 cwt. manure, two-thirds super. and one-third bonedust, to the acre. The rainfall from the time of sowing to the time of reaping was 7·68 inches, and for the year 13 inches.

GOAT'S FLESH.

It is a curious fact, but true, that black-haired animals have darker skins and darker meat than white-haired animals. This accounts for that whiter appearance of the Angora goat flesh, which enables the dealer to market it as mutton. The black hair, from a poetic standpoint, casts its perpetual shadow on the viand and leaves it shaded. The goat flesh is a pleasant and healthy meat. It should be so, since the goat is an eater of clean food, and is possibly the freest from disease of any quadruped. The raising of goats is becoming more important, as it is a well-paying industry. The raising of Angora goats is extensively engaged in in Bandera county, Texas, at a good profit; 20 cents per lb. and upwards is paid for the mohair, and one good goat will yield 4 or 5 lb. per year. The scrub goats, or those that yield poorly in mohair, are either killed for mutton or sold at about 2 dollars per head to commission men.

WEIGHT OF HONEY PER COLONY OF BEES.

A writer on beekeeping in *Town and Country* says:—The question is often asked, "How much honey will a colony of bees make in one season?" One might as well ask, "How many apples will one apple-tree bear?" There are many conditions to be taken into account. In a general way we can say that an average of 50 lb. of surplus honey per colony each year for a term of years is considered good returns; some do better than that, but they are those who occupy favoured localities. My bees have done well, but I cannot give exact figures. As far as individual colonies are concerned, I have had yields all the way from nothing up to 225 lb. of finished comb honey in a single season. In good seasons I usually make my apiaries yield about 1000 lb. of surplus per colony, spring count, for the whole apiary. It is well to remember that a small number of colonies can be made to produce relatively much larger yields than a large number; therefore, don't be figuring and be deceived into the conclusion that you can make a great fortune out of an extensive bee business because someone has reported making £4 or even £8 from a single colony in one season.

AGRICULTURAL AND HORTICULTURAL SHOWS.

The Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respective shows, notify him of the date, and also of any change in date which may have been decided on.

The Markets.

AVERAGE PRICES FOR MARCH.

Article.		MARCH. Top Prices.		
		£	s.	d.
Bacon	lb.	0	0	6⅝
Bran	ton	5	7	6
Butter, First	lb.	0	0	8½
Butter, Second	,,	0	0	6
Chaff, Mixed	ton	3	8	9
Chaff, Oaten	,,	4	8	9
Chaff, Lucerne	,,	3	5	0
Chaff, Wheaten	,,	2	16	3
Cheese	lb.	0	0	5
Flour	ton	8	6	3
Hay, Oaten	,,	3	13	9
Hay, Lucerne	,,	2	17	6
Honey	lb.	0	0	1½
Rice, Japan (Bond)	ton	15	12	6
Maize	bush.	0	3	4¾
Oats	,,	0	3	8½
Pollard	ton	5	6	10½
Potatoes	,,	5	5	0
Potatoes, Sweet	,,	2	5	0
Pumpkins	,,	2	12	6
Sugar, White	,,	15	17	6
Sugar, Yellow	,,	13	10	0
Sugar, Ration	,,	10	0	0
Wheat	bush.	0	3	3¼
Onions	cwt.	0	5	3
Hams	lb.	0	0	9¾
Eggs	doz.	0	1	4
Fowls	pair	0	3	6
Geese	,,	0	5	3
Ducks, English	,,	0	3	0¾
Ducks, Muscovy	,,	0	4	2¼
Turkeys, Hens	,,	0	6	10½
Turkeys, Gobblers	,,	0	13	4

ENOGGERA SALES.

Article.	MARCH. Top Prices.		
	£	s.	d.
Bullocks	6	19	4½
Cows	4	16	10½
Wethers, Merino	0	13	2¼
Ewes, Merino	0	10	0¾
Wethers, C.B.	0	13	6¾
Ewes, C.B.	0	12	9
Lambs	0	10	6

Orchard Notes for May.

By ALBERT H. BENSON.

The hints given in last month's notes on the gathering, handling, and marketing of citrus fruits apply equally to the present month, with this difference, however, that even more care is required, as the riper citrus fruits become, the more readily are they bruised and injured. May being usually a more or less dry month on the coast, the opportunity should be taken of cleaning up all weeds and rubbish that may have accumulated during the summer and autumn, and getting the surface of the land into a good state of cultivation, so that the comparatively small rainfall of the winter months may be conserved in the soil for the trees' growth. Unless this is done, fruit trees, especially citrus, are apt to suffer, especially if growing on shallow or badly drained soil with a retentive subsoil. Where not already done, all dead or worthless trees should be dug out; and if fresh trees are to be planted in the same place, then the holes from which the trees have been taken should be allowed to remain open, and the soil should be well exposed to the action of the atmosphere and be well sweetened. Land intended for planting during the winter should be got ready, more especially if it is new land, as it is a mistake to delay the preparation of the land too much, or to plant the trees in a raw, unsweetened, and improperly prepared land. What planting has to be done, see that it is done well, as an acre of land properly prepared will pay better than twice or three times that quantity treated anyhow.

Towards the end of the month, slowly soluble manures, such as boiling-down refuse or coarse bones, may be applied to the land, as they will become slowly available; and when the spring growth starts, the trees will get the benefit. Quickly soluble manure should not be applied now, but should only be used during a period of active plant growth, otherwise they are apt to be lost. Where possible, don't destroy the weeds and refuse of an orchard unless the same is diseased, or is likely to form a bad harbour for injurious insects, but rather form it into a compost heap, preferably with lime, and allow it to become well rotten, when it will be found to be a valuable mulch for citrus and other trees in many soils; as, though our soils, as a rule, are great producers of weeds, many are actually deficient in vegetable matter, so that it is a mistake to burn off all weeds, grass, or other rubbish. This deficiency of organic matter in the soil is a serious consideration, as soils deficient in organic matter are usually deficient in nitrogen, and also they are deficient in the power to retain moisture—a matter of extreme importance in a country like this, where we are subject to such long spells of dry weather.

In the colder districts the pruning of deciduous trees may be commenced towards the end of the month, but in other parts of the colony it is better to wait longer, as the leaves are not off and the sap is not down. In the case of grapes, early pruning is always to be advocated where possible, as it is best to prune as soon as ever the sap is down. Pineapples, where at all subject to frost, should receive a light covering of grass or other similar material as a protection, or, where practicable, as in the case of scrub lands subject to slight frosts, they should be covered with a light framework covered with palm leaves or similar material.

Palm stems or saplings resting on forked posts, placed on either side of the bed to be protected, make a good framework; and with palm-leaves, tea-tree bush, or other similar material laid across from sapling to sapling, a very cheap and efficient protection against frost is obtained.

Gather and destroy all infested guavas, oranges, custard apples, &c., so as to destroy the larvæ of any fruit flies or moths that may be in them, as if these insects are well killed down now there will be many less to deal with next spring, and there is a chance of the earlier fruits being harvested without much loss.

Inspect all citrus and other fruit trees carefully, especially those in new districts; and where scale insects or other diseases are found, stamp them out before they get a complete hold of the orchard, as trees can be easily and cheaply cleaned if taken in time, that will be both difficult and expensive to clean if neglected.

Farm and Garden Notes for May.

THE land should now all have been ploughed and made ready for sowing. No time should be lost in sowing early wheat, barley, oats, rye, vetches, and lucerne. For lucerne especially, the land should be thoroughly clean and in fine tilth. Earth up potatoes. Cut tobacco, and pick cotton if any is grown. A good winter supply of green stuff for stock should be provided for, particularly by those who own a dairy herd. For this purpose pasture grasses should be laid down such as are suitable to the district and climate. An excellent mixture for permanent grasses consists of:—

	lb.		lb.
Cocksfoot	7	Meadow fescue ...	2
Prairie grass	12	Meadow foxtail ...	1
Perennial rye grass ...	10	Timothy grass ...	2
Rib grass	2	Sweet vernal... ...	2
Kentucky blue grass ...	1	Hard fescue	1
White clover	2		
			42

sufficient for an acre.

The land, having been ploughed during the summer months, should have lain for some time exposed to the atmosphere to fallow. The harrow should then have rendered the soil sufficiently fine for sowing, which should be done, if possible, just before rain. Although April is the best time to sow, if the weather be favourable, grass seed may be sown as late as August or September. A few acres of clover or other grasses form a valuable adjunct to the farm, and will support a large number of cattle in proportion to acreage.

Kitchen Garden.—Prepare all the ground by digging and manuring for successive crops. Plant out cabbages and cauliflowers for a succession. Transplant onions. These latter may still be sown, although it is late in the season. Splendid crops have resulted from seed sown in April. Keep all the seed beds clean. Make sowings of beans, peas, radish, lettuce, carrots, parsnips, beet, leek, rhubarb, cabbage, spinach, mustard and cress, and herbs. Dig and prepare beds for asparagus. In preparing the beds, the best soil must be chosen. The most favourable is a deep, sandy loam, dug to a depth of 18 inches, and thoroughly manured, a good sprinkling of salt being added a month before the planting season, that the rain and atmosphere may act upon it. Then peg out the beds 4 feet wide, leaving a path 2 feet wide on each side of the bed. Plant four rows in each bed, keeping the front rows 9 inches from the side; cover the crowns at least 3 inches with good loose soil and manure mixed; rake to a smooth surface. The plants must be 15 inches asunder. The object of having the beds so narrow is that they may not be trodden on, as, from the length of time they remain without further opportunity for deep digging, everything must be avoided which would tend to compress the earth. For old beds, cut the stalks down in May, and dig the beds lightly over with a fork, and lay over them a good dressing of manure. In September you may begin to cut; you can ensure the blanching of the tender shoots by placing earthern pipes or bamboo joints over them.

Transplant strawberries—such as Trollope's Victoria, Marguerite, and other prolific sorts.

Horticultural Notes for May.

By PHILIP MAC MAHON,
Curator, Botanic Gardens, Brisbane.

The mean shade temperature of May in Brisbane is 61 degrees, which is a drop of 9 degrees from the mean shade temperature of last month. May is one of our driest months, the mean rainfall over a period of thirty-eight years being 2·94 inches, with a mean of ten days during the month upon which rain fell.

Flower Garden.—The general work for the month consists in digging up all places which may be intended for planting. All new beds, borders, &c., should be now laid out as soon as possible. In breaking up new ground and in digging borders which have lain for some time uncultivated, it is well to throw the earth up as roughly as possible with the spade. A piece of ground after a good digger should show a number of prism-shaped projections where the "spits" have been laid from the spade. This exposes to the influence of the air and sun the greatest possible quantity of soil. Too much cannot be said of the advantages of subsoiling. My attention was directed to a piece of land on the Government Experimental Orchard, at Redland Bay, which had been subsoiled, and the complete change so effected, in the productiveness of the land as shown by the crops (bananas) growing upon the subsoiled ground and an adjoining ground not so treated, was evident to anyone. I think I have before, in the pages of this *Journal*, mentioned the good work done by a small plough called Avery's Hardpan Subsoil Plough. Land here, upon which nothing would grow, has been reclaimed by the use of this really wonderfully cheap and handy tool.

Shrubs.—Many shrubs may now be planted, but there is often a mistake made in planting tropical shrubs and trees at this time of the year. A glance at the table of temperatures and rainfalls will show that the growth conditions steadily decline from now till the middle of July, when the turn towards a damper and moister atmosphere takes place. For plants of the type which may be planted in England in October and November, this month will suit. It is well for those who have had old-country experience to bear in mind that May corresponds to November in northern latitudes. Last year the shade temperature varied from 83·7 degrees on the 1st at 3 p.m. to 41·3 degrees on the 24th at 7 a.m., at Brisbane: certainly not much in this to remind us of November in England, but with the vast majority of tropical plants the action of root and leaf are simultaneous, and these temperatures are not conducive to leaf-action in such plants, especially with a rainfall of only about 1½ inches for the month. All deciduous trees can now be planted. The pot-hole system of planting trees is much to be condemned. The trees resent it themselves, and I am acquainted with trees so planted from ten to twenty years ago which have hardly moved in that time. The system alluded to is that of digging a miniature well and planting in that. Of course, the first shower fills it, and thenceforth your tree has all its work to keep alive at all, not to speak of fulfilling the purpose for which you planted it. Nature having intended plants to occupy different situations and soils—or, rather, having evolved them under the stress of different conditions—each has a root system suited to its special needs, and the want of a little study of this leads to much disappointment in planting. Trees, for instance, of the Camphor Laurel type, with roots descending straight down for the most part, have no chance whatever in a soil in itself good, but overlying a dense clay subsoil. This, however, will

be found to suit members of the Fig family, such as the Moreton Bay fig, the roots of which forage for long distances near the surface of the earth, often actually travelling on the very surface when the soil is very shallow and moist. There are all intermediate stages between these two. No one who wishes to keep his garden for the growth of the more tender and smaller plants will tolerate one of those surface rooters in its vicinity. As I write, a small bed is being turned up near my office. It is completely eaten out by the roots of cacti which grow quite near, and which have a habit of sending their roots on long foraging expeditions. If you had much to do with plants, you could hardly resist the belief that the trees know in which direction food is to be found, so soon do myriads of tiny rootlets become developed where food is to be found; but no doubt the roots forage in all directions, and become specially developed in the quarters in which copious supplies are discovered.

Lawns which have been top-dressed and well rolled during damp weather will now be looking well, and should be kept closely cut, and this is a time when neatness in the garden is particularly telling. In the summer time it is not perhaps in keeping with the riotous mood of Nature to have everything so spick and span, but in the winter there is more of an English air about our gardens, and neatness is indispensable.

You have plenty of annuals to plant out if you have followed directions. You may save yourself much disappointment if you place around your newly-planted annuals a "mulch" of manure or even short grass to conserve the moisture in the soil.

You will remember I mentioned last month that shrubs, roses, &c., should be thinned out and shortened back with a view to the ripening of their wood prior to the final pruning. This final pruning may take place this month. Mignonette may yet be sown out of doors in the position which it is to occupy. It often happens here that the winter season is considerably prolonged, and as flowering annuals die out it is well to have some to take their place. A few boxes of the sorts recommended in a recent paper may be sown early in the month, and kept in readiness for such an occasion. They often come in usefully.

Last week we tried fumigating our greenhouses with cyanide of potassium. The formula was that used in the ordinary work of fumigating, but at one-fourth the strength—that is to say, we only allowed one grain of the cyanide to a cubic foot of air space The houses are not by any means airtight. They are full of openings. Four clay pans were charged at 5 p.m., the doors closed, and the place left until morning, when every animate thing was dead. Frogs, ants, cockroaches, lizards, &c., all perished, and any scale insects in the houses were, if not killed outright, greatly weakened. Those in the travelling stage were all killed.

A curious observation made was that some of the very hardiest plants were injured, and those reputed most tender escaped. Thus every plant of *Pilea muscosa*, a common outdoor plant, perished; while delicate ferns and exotic plants were not touched. *Asparagus plumosus*, a fairly hardy plant, suffered severely.

Public Announcements.

The Editor will be glad to receive any papers of special merit which may be read at meetings of Agricultural and Pastoral Associations in Queensland, reserving, however, the right to decide whether their value and importance will justify their publication.

The *Queensland Agricultural Journal* will be supplied to all members of Agricultural and Horticultural Societies who do not derive their livelihood solely from the land, on payment, in advance, of an annual subscription of 5s.

LIST OF AGRICULTURAL, HORTICULTURAL, AND PASTORAL SOCIETIES AND ASSOCIATIONS IN QUEENSLAND.

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Allora ...	Central Downs Agricultural and Horticultural Association	J. H. Buxton... ...	
Avondale ...	Avondale Farmers' and Planters' Association	N. J. Mikkelsen ...	
Ayr	Lower Burdekin Farmers' Association ...	Winsor H. Wilmington	
Beaudesert ...	Logan and Albert Pastoral and Agricultural Society	M. Hinchcliffe ...	11 May
Beenleigh ...	Agricultural and Pastoral Society of Southern Queensland	Wilson Holliday ...	14 April
Biggenden ...	Biggenden Agricultural and Pastoral Society	Charles H. Peppin ...	14 June
Biggenden ...	Biggenden Farmers' Association	Charles H. Peppin ...	
Birthamba ...	South Kolan Agricultural and General Progress Association	G. W. Nixon ...	
Blackall ...	Barcoo Pastoral Society	F. Clewett	
Boonah ...	Fassifern and Dugandan Agricultural and Pastoral Association	J. A. McBean ...	14 and 15 June
Bowen ...	Pastoral, Agricultural, and Mining Society ...	J. E. Smith	17 Aug.
Bowen ...	Preston Farmers' Association, Lower Proserpine	G. Archer	
Bowen ...	Proserpine Farmers' and Settlers' Association	G. W. Pott	
Booyal ...	Booyal Farmers' Progress Association ...	Thos. Skillington ...	
Brisbane ...	Horticultural Society of Queensland	J. F. Bailey	26 and 27 April
Brisbane ...	Moreton Agricultural, Horticultural, and Industrial Association	J. Duffield	
Brisbane ...	Queensland Acclimatisation Society	E. Grimley	
Brisbane ..	Queensland Fruit and Economic Plant Growers' Association	G. K. Seabrook ...	
Brisbane ...	National Agricultural and Industrial Association of Queensland	H. C. Wood	10, 11, and 12 Aug.
Brisbane ...	Queensland Stockbreeders' and Graziers' Association	F. A. Blackman ...	
Brisbane ...	United Pastoralists' Association	Fredk. Ranson ...	
Bundaberg ..	Bundaberg Horticultural and Industrial Society	Jos. Campbell ...	
Bundaberg ...	Council of Agriculture	H. E. Ashley... ...	
Bundaberg ...	Woongarra Canegrowers' and Farmers' Association	W. H. Dart	
Burpengary...	Burpengary Farmers' Association	C. H. Ham	
Byrnestown...	Byrnestown Farmers' Progress Association ...	J. Duffiey	
Caboolture ...	Caboolture Farmers' Association	G. Mallet	
Cairns ...	Aloombah Farmers' Association	Chas. R. Spencer ...	
Cairns ...	Cairns Agricultural, Pastoral, and Mining Association	A. J. Draper... ...	28 and 29 Sept.
Cairns ...	Cairns District Coffee Growers' Association...	W. A. Hannam ...	
Cairns ...	Cairns District United Farmers' Association	Wm. Griffin ...	
Cairns ...	Hambledon Planters' Association	E. Whitehouse ...	
Charleville ..	Central Warrego Pastoral and Agricultural Association	E. F. C. Manning ...	25 and 26 May

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Charters Towers	Towers Pastoral, Agricultural, and Mining Association	W. Tilley	30 and 31 May; 1 June
Childers ...	Isis Agricultural Association	H. Epps	
Childers ...	Childers Progress Branch, Isis Agricultural Association	N. Rosenlund ...	
Childers ...	Doolbi Mill Branch, Isis Agricultural Association	W. T. H. Job ...	
Childers ...	Childers Mill Branch, Isis Agricultural Association	H. Epps	
Clermont ...	Peak Downs Pastoral, Horticultural, and Agricultural Society	F. Leysley	
Clermont ...	Peak Downs Dairymen and Settlers' Association	A. G. Pursell ...	
Cooktown ...	Cook District Pastoral and Agricultural Society	W. R. Humphreys ...	
Cooran ...	Cooran Progress and Agricultural Association	Thos. Smith	
Cordalba ...	Cordalba Farmers' Association	B. Goodliffe	
Currajong ...	Currajong Farmers' Progress Association ...	Wm. Howard ...	
Cunnamulla	South Warrego Pastoral Association	J. Winward	
Dalby ...	Northern Downs Pastoral and Agricultural Association	W. M. Alexander ...	July
Deception Bay	Deception Bay Farmers' Association	B. J. T. Liscombe ...	
Degilbo ...	Degilbo District Farmers' Association ...	J. Harvey	21 and 22 June
Gayndah ...	Gayndah Agricultural and Horticultural Association	J. C. Kerr	
Gin Gin ...	Pastoral and Agricultural Society of Gin Gin	E. K. Wollen ...	
Gladstone ...	Gladstone Pastoral and Agricultural Association	W. J. Manning ...	
Gooburrum, Bundaberg	Gooburrum Farmers' and Canegrowers' Association	W. J. Tutin	
Goondiwindi	MacIntyre River Pastoral and Agricultural Society	A. Warden	
Gympie ...	Agricultural, Mining, and Pastoral Society	F. Vaughan	13 and 14 Sept.
Gympie ...	Chatsworth Farmers' Progress Association ...	William Bellman ...	
Gympie ...	Deep Creek Farmers' Progress Association ...	W. Reid	
Gympie ...	Gympie Horticultural Society	Charles Brasch ...	19 and 20 April
Gympie ...	The Pie and Eel Creek Farmers' Association	D. J. O'Farrell ...	
Gympie ...	Gympie Central Farmers' and Progress Association	J. Howard Maynard	
Haslemore, Victoria, Herbert Riv.	Herbert River Farmers' League	Alfred Henry ...	
Helidon ...	Helidon Scrub Farmers' Progress Association	M. Morgan	
Herbert River	Halifax Planters' Club	H. G. Faithful ...	
Herbert River	Macnade Farmers' Association...	E. C. Biggs	
Herbert River	Ripple Creek Farmers' Association	J. W. Grimes ...	
Herberton ...	Mining, Pastoral, and Agricultural Association	John M. Hollway ...	3 and 4 April
Hodgson ...	Hodgson Farmers' Association	C.W. Nimmo ...	
Hughenden...	Hughenden Pastoral and Agricultural Association	H. P. Blackall ...	7 and 8 May
Ingham ...	Herbert River Farmers' Association	...	
Ingham ...	Herbert River Pastoral and Agricultural Association (Stock Show)	P. J. Cochrane ...	15 and 16 June
Ingham ...	Herbert River Pastoral and Agricultural Association (Agricultural Show)	P. J. Cochrane ...	Sept.
Ipswich ...	Ipswich and West Moreton Agricultural and Horticultural Society	P. W. Cameron ...	21 Sept.
Ipswich ...	Queensland Pastoral and Agricultural Society	Elias Harding ...	1 and 2 June
Kandanga (near Gympie)	Kandanga Farmers' Association	N. Rasmussen ...	
Kolan ...	Kolan Canegrowers' and Farmers' Association	C. Marks	
Ladeside ...	Mungore Farmers' Association...	J. M. Robinson ...	
Laidley ...	Lockyer Agricultural and Industrial Society	John Fielding ...	25 and 26 July
Loganholme...	Logan Farming and Industrial Association ...	F. W. Peek	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Longreach ...	Longreach Pastoral and Agricultural Society	J. P. Peterson ...	12 April
Lucinda Point	Victoria Farmers' Association	W. S. C. Warren ...	
Mackay ...	Agricultural, Pastoral, and Mining Association	F. Black	
Mackay ...	Pioneer River Farmers' Association	E. Swayne	28 and 29 June
Mapleton, *viâ* Nambour	Mapleton and Dulong Fruitgrowers' and Farmers' Progress Association	W. J. Smith	
Maryborough	Maryborough Horticultural Society	H. A. Jones	
Maryborough	The Island Farmers' Progress Association ...	C. A. Schmidt ...	
Maryborough	Wide Bay and Burnett Pastoral and Agricultural Society	G. Willey	4, 5, and 6 July
Miallo ...	Miallo Progress Association	E. F. Welchman ...	
Milbong ...	Milbong Farmers' Association	T. R. Garrick ...	
Mitchell ...	Mitchell and Maranoa Pastoral, Agricultural, and Vinegrowers' Association	H. J. Corbett ...	
Mosman River	Mosman River Farmers' Association	Geo. W. Muntz ...	
Mount Cotton	Mount Cotton and Tingalpa Division Fruitgrowers' and Farmers' Association	F. N. Sharman ...	
Mount Mee...	Mount Mee Farmers' Association	R. Thomas	
Mount Morgan	Mount Morgan Mining, Agricultural, Poultry, Pastoral, and Horticultural Society	G. Orford	
Mount Morgan	Mount Morgan Agricultural, Pastoral, and Poultry Society	Thos. W. Walker ...	
Mundoo ...	Johnstone River Farmers' Association ...	J. McInnes	
Nerang ...	South Queensland and Border Pastoral and Agricultural Society	W. J. Browne ...	8 Sept.
North Isis ...	North Isis Canegrowers' Association	W. J. Young ...	
Pialba ...	Pialba Farmers' Association	J. B. Stephens ...	
Pickenjennie	Wallumbilla Selectors' League	George Dalziel ...	
Pickenjennie	Pickenjennie Branch, Wallumbilla Selectors' League	George Dalziel ...	
Pinbarren ...	Pinbarren Agricultural and Progress Association	H. Armitage, senr. ...	
Port Douglas	Pastoral, Agricultural, and Mining Association	W. H. Dorrat ...	
Razorback ...	The Razorback Fruitgrowers' Association ...	Robert Tinning ...	
Rockhampton	Central Queensland Farmers' and Selectors' Association	T. Whitely, Coowonga	
Rockhampton	Central Queensland Pastoral Employers Association	G. Mackay	
Rockhampton	Central Queensland Stockowners' Association	R. R. Dawbarn ...	
Rockhampton	Rockhampton Agricultural Society	R. R. Dawbarn ...	29 and 30 May
Roma ...	Western Queensland Pastoral and Agricultural Association	Angus McPherson ...	25 and 26 July
Roma ...	Yingerbay Farmers' Association	Alex. C. McIntyre ...	
Rosewood ...	Farmers' Club	P. H. Adams... ...	13 Sept.
Southport ...	Southport Horticultural Society	E. Fass	19 April
Springsure ...	Queensland Pastoral Society	G. R. Milliken ...	
Stanthorpe ...	Border Pastoral, Agricultural, and Mining Society	Geo. Simcocks ...	22 and 23 Feb.
Stanthorpe ...	Stanthorpe Horticultural and Viticultural Society	R. Hoggan	
Stanwell ...	The Stanwell Agricultural Society	A. Spanner	24 May
St. George ...	Balonne Pastoral and Agricultural Association	T. M. Cummings ...	
Tinana ...	Tinana Fruitgrowers' and Farmers' Association	Chas. Parke	
Toowoomba...	Darling Downs Horticultural Association ...	H. Hopkins	
Toowoomba...	Drayton and Toowoomba Agricultural and Horticultural Society	H. Symes	
Toowoomba...	Royal Agricultural Society of Queensland ...	F. Burtt	1, 2, and 3 Aug.
Townsville ...	Townsville Pastoral, Agricultural, and Industrial Association (formerly North Queensland Pastoral and Agricultural Association)	J. N. Parkes	6 and 7 June
Wallumbilla	Wallumbilla Selectors' League	George Dalziel ..	
Warwick ...	Eastern Downs Horticultural and Agricultural Association	J. Selke	31 Jan. & 1 Feb.
Wellington Point	Wellington Point Agricultural, Horticultural, and Industrial Association	F. W. Wort	13 June
Woombye ...	Woombye Fruitgrowers' Association	P. S. Hungerford ...	
Woowoonga	Woowoonga Scrub Farmers' Association ...	H. B. Griffiths ...	
Zillmere ...	Zillmere Horticultural Society	C. McF. Fischer ...	20 Jan.

"THE DISEASES IN PLANTS ACT OF 1896."

Department of Agriculture,
Brisbane, 19th January, 1899.

HIS Excellency the Governor, with the advice of the Executive Council, and in pursuance of the provisions of "*The Diseases in Plants Act of* 1896," has been pleased to make the following further Regulations.

J. V. CHATAWAY.

THE FUMIGATION OF FRUIT FOR EXPORT.

1. Any one who wishes to erect a chamber or building for the fumigating of fruit is requested to give notice to the Under Secretary for Agriculture, who will take steps to see that the chamber or building is properly constructed.

2. When it is required to fumigate fruit for export, twenty-four hours' notice must be given to the said Under Secretary or such other officer as may be duly authorised to accept such notice.

3. The operation of fumigating must be conducted under the control of an officer authorised by the Minister for Agriculture.

4. The fumigating chamber may be made of any convenient size or material, the essential point being that it shall be capable of being closed absolutely airtight, and provided with a flue-pipe in the roof which can be opened or closed to allow of the escape of the gas after fumigation. The flue must be provided with a box or chamber to contain caustic soda or potash to destroy the gas.

The fumigating chamber must be provided with a shutter or sliding panel in the lower portion of the door or wall.

Door, flue, and shutter must all be made to close absolutely airtight.

DIRECTIONS FOR FUMIGATING WITH HYDROCYANIC ACID GAS.

Proportions of Ingredients.—For every 150 cubic feet of room take 1 ounce of cyanide of potassium, 5 fluid ounces sulphuric acid, 10 fluid ounces water.

Having placed the fruit to be fumigated in the chamber, see that the flue and the shutter in the door or lower part of all are properly closed.

The acid is then to be diluted in the following manner:—The whole of the water is placed in a shallow china or glazed earthenware vessel, such as an ordinary wash-hand basin. (Metal vessels are inadvisable unless they are leaden ones.) The sulphuric acid is next poured on to the water in a thin stream, stirring the while with a stick. Do not mix by adding the water to the acid.

The basin containing the acid thus diluted (which should be allowed to cool) is now placed in the fumigating chamber, and the cyanide of potassium is emptied into it.

The gas is given off with great violence, and the door should be immediately closed.

The whole is now to be left to itself for one hour. At the end of this time the shutters in the flue and in the door are opened, and the draught produced drives the gas out of the chamber. At the end of half an hour the door is thrown open, and if the draught has been effective there should be hardly any trace of hydrocyanic gas recognisable. The chamber may be left in this condition for another ten minutes or a quarter of an hour. The fruit is now to be moved and allowed to remain in a well ventilated place, preferably out of doors, for another half an hour. Samples of fruit will be examined from time to time by the entomologist.

Caution.—As hydrocyanic acid gas is most deadly in its effects on animal life, the greatest care must be taken in its use.

Department of Agriculture,
Brisbane, , 18 .

This is to certify that has treated cases of citrus fruit with hydrocyanic acid gas for one hour, under my supervision. These cases have been branded "Crown" over "Passed."

Shipping marks:
Per S.S.:
Consigned to:

Department of Agriculture,
Brisbane, 26th January, 1899.

THE following Proclamation by His Excellency the Governor of New South Wales is published for general information.

J. V. CHATAWAY.

NEW SOUTH WALES, to wit.
(L.S.)
HAMPDEN, *Governor.*

PROCLAMATION.

By His Excellency The Right Honourable HENRY ROBERT, VISCOUNT HAMPDEN, Governor and Commander-in-Chief of the Colony of New South Wales and its Dependencies.

WHEREAS the Governor is empowered by Section 9 of the "Vegetation Diseases Act, 1897," from time to time, by Proclamation in the *Gazette*, to declare any fungus or vegetable parasite whatever to be a fungus within the meaning of the said Act: Now, therefore, I, HENRY ROBERT, VISCOUNT HAMPDEN, the Governor aforesaid, with the advice of the Executive Council, do, by this my Proclamation, declare Black Spot (*Fusicladium*) to be a fungus within the meaning of the said Act.

Given under my Hand and Seal, at Government House, Sydney, this twenty-second day of December, in the year of our Lord one thousand eight hundred and ninety-eight, and in the sixty-second year of Her Majesty's reign.

By His Excellency's Command,
JOSEPH COOK.

GOD SAVE THE QUEEN!

Department of Agriculture,
Brisbane, 25th May, 1899.

HIS Excellency the Governor, with the advice of the Executive Council, has, in pursuance of the provisions of "*The Slaughtering Act of* 1898," been pleased to make the following Regulations.

J. V. CHATAWAY.

REGULATIONS UNDER "THE SLAUGHTERING ACT OF 1898."

Definitions.

1. Save as herein otherwise provided, in these Regulations the terms used have the meanings respectively assigned to them by "*The Slaughtering Act of* 1898."

The term "Stock" means and includes cattle, sheep, and swine;

The term "Licensing Court" means a Police Magistrate or if he is absent or there is no Police Magistrate, then any two justices sitting in a Court of Petty Sessions having jurisdiction in the district within which a slaughter-house is or is proposed to be established;

The term "Inspector" means the inspector (if any) to whom a district is assigned, or if he is absent, or there is no such inspector then any inspector appointed under the provisions of "*The Slaughtering Act of* 1898";

The term "Owner of stock" means the owner whether jointly or severally of the stock, or the authorised agent or superintendent of the owner, or the drover or person in charge of the stock.

Unlicensed slaughter-house.

2. Any person who establishes or keeps an unlicensed slaughter-house is guilty of an offence against these Regulations.

Illegal slaughter.

3. No person shall slaughter at any place other than at a licensed slaughter-house any stock the flesh of which is intended to be used for meat.

Licensing Court.

4. Subject to these Regulations, the Licensing Court may license slaughter-houses established or proposed to be established within a district.

Application.

5. Every person who desires to obtain a license or the renewal of a license for a slaughter-house shall make an application therefor in writing in the form in the First Schedule hereto or to the like effect.

Time for applying.

6. Every application shall be addressed to the Licensing Court of the district within which the slaughter-house is or is proposed to be established, shall be lodged with the proper Clerk of Petty Sessions, and shall be accompanied by the license fee hereinafter prescribed. Applications for licenses shall be so lodged on or before the fourteenth day of December, March, June, and September in each year. Applications for the renewal of licenses shall be so lodged on or before the fourteenth day of December in each year.

Duty of clerk of petty sessions.

7. Upon the receipt of every such application, the clerk of petty sessions shall forthwith forward a copy of the same to the local authority of the district and also to the inspector.

Representatives of local authority.

8. The local authority of the district may make to the Licensing Court such representations, in writing or otherwise, with respect to every such application, as the local authority thinks fit.

Report of inspector.

9. It shall be the duty of the inspector, upon the receipt of every such copy of an application, to inspect the premises in respect of which a license or the renewal of a license is applied for, and to report thereon to the Licensing Court. He shall either make such report in writing under his hand, or, if directed so to do by the chief inspector, shall personally attend at the sittings of the Licensing Court, and there orally report to the Court upon the same.

The hearing.

10. The Licensing Court shall sit for the hearing and determination of all applications for licenses on the first Tuesday in the months of January, April, July, and October in every year.

The Licensing Court shall sit for the hearing and determination of all applications for the renewal of licenses on the first Tuesday in the month of January in every year.

After considering the report of the inspector and the representations, if any, of the local authority of the district, the Court may, subject to these Regulations—

(1) Grant the application; or
(2) Adjourn the application for the purpose of the execution by the applicant of such works as in the opinion of the Licensing Court are necessary to render the premises suitable and proper for the slaughter of stock; or
(3) Refuse the application.

Duration of license.

11. Save as hereinafter provided, a license for a slaughter-house shall remain in force for the period of one year, but may from time to time be renewed for a like period. Provided that a new license granted for a slaughter-house shall only remain in force until the sitting of the Licensing Court held in the month of January following the date on which such license was granted. Provided further that all existing licenses shall remain in force until the sitting of the Licensing Court held in the month of January next.

Fees for licenses.

12. The annual fee payable in respect of the license or the renewal of the license of a slaughter-house shall be twenty shillings.

Fees for defraying expenses.

13. The fees payable by the licensee of a slaughter-house for the purpose of defraying the expenses of inspection shall be as follows, that is to say:—

	s.	d.
For every bullock, steer, cow, or heifer slaughtered ...	0	3
For every 12 sheep or calves slaughtered	0	3
For every head of swine slaughtered	0	3

Such fees shall be paid by the licensee to the inspector monthly, or at such shorter intervals as the inspector may require.

Receipt.

14. The inspector shall, upon the payment of such fees, give to the licensee a receipt under his hand in the form of the Second Schedule hereto.

Delivery note.

15. When stock are delivered at a slaughter-house to be slaughtered, the owner of the stock shall deliver to the owner of the slaughter-house a way bill or delivery note of the stock, setting forth the number, the description, and the brands or marks of the stock, and signed by the owner thereof.

The owner of the slaughter-house shall retain and preserve every such way bill or delivery note, and shall, on demand, produce the same to the inspector.

Slaughtering book.

16. The licensee of every slaughter-house shall keep a book called a "Slaughtering Book," in which shall be correctly recorded all the particulars set out in the Third Schedule hereto; and such book shall be open at all reasonable times to the inspection of any inspector, or any inspector of brands or police officer, who may make any copy of or extract therefrom.

Floors.

17. The floor of every place in a slaughter-house where stock are pithed or slaughtered, or where meat is dressed, prepared, treated, or stored, shall, if required by the inspector, be constructed of concrete or otherwise rendered impervious, to his satisfaction.

Drainage; ventilation.

18. Every slaughter-house shall be drained and ventilated to the satisfaction of the Inspector.

Blood.

19. In every slaughter-house all blood shall be boiled, desiccated, or otherwise treated to the satisfaction of the Inspector.

Privies.

20. Every water-closet, privy, cesspool, and urinal used in connection with a slaughter-house shall be situated at a distance of not less than one hundred yards from any building, enclosure, or place in or at which stock are slaughtered or meat is dressed, prepared, treated, or stored.

Pigsties.

21. Every pigsty, enclosure, and place where swine are kept at a slaughter-house shall be situated at a distance of not less than two hundred and fifty yards from any building, enclosure, or place in or at which stock are slaughtered or meat is dressed, prepared, treated, or stored.

Offal to swine.

22. Swine shall not be fed with offal at a slaughter-house, nor shall any offal be removed therefrom for the purpose of feeding swine, unless such offal has first been thoroughly cooked.

Notice of slaughtering.

23. The owner of every slaughter-house shall give to the inspector such notice of his intention to slaughter stock as will enable the inspector to inspect such stock.

Tampering with meat.

24. Until stock slaughtered have been inspected by the inspector the pleuræ are not to be stripped or otherwise interfered with, and no part of the carcass is to be cut away, manipulated, or interfered with in any manner which may prevent the discovery of disease or may alter the true condition of the meat.

The inspector may condemn any stock or meat which in his opinion has been dealt with in contravention of the provisions of this Regulation.

Branding meat.

25. When the inspector has inspected any meat and approved of the same, he shall brand each separate quarter of beef and each carcass or quarter of mutton with a mark or stamp.

Any person who wilfully removes or obliterates any such mark or stamp, or who, not being an inspector, affixes or causes to be affixed to any meat any such mark or stamp, is guilty of an offence against these Regulations.

Calves.

26. Calves less than four weeks old are not to be slaughtered for meat.

Condemned meat.

27. Condemned meat at a slaughter-house shall be rendered unfit for the food of man in the mode directed by the inspector.

Removal of hides, &c.

28. Offal and the hides, skins, heads, and feet of stock slaughtered at a slaughter-house shall only be removed from the premises in the manner and at the times directed by the inspector.

The contents of paunches and of intestines shall be deposited in the place appointed by the inspector for the purpose.

Carriage of meat.

29. Meat shall be carried from the slaughter-house to the butcher's shop in vehicles approved by the inspector.

Every such vehicle shall be provided with a proper roof, and shall be so constructed as to permit of a free current of air.

Meat shall be carried in such vehicle either suspended from the roof or sides thereof, or so arranged that a free current of air may circulate between the carcasses or portions of carcasses being carried.

Blowing meat, &c.

30. No person shall blow with his breath or otherwise into any meat, or eject any salt, liquid matter, or other substance from his mouth thereon.

No person shall treat, dress, or prepare any meat by means of any preservative or other substance which, in the opinion of the inspector, injures, or is likely to injure, such meat or to render it unfit for the food of man.

Offences.

31. Any person who contravenes any of the provisions of these Regulations is guilty of an offence, and is liable to a penalty not exceeding fifty pounds.

When a licensee of a slaughter-house, having been convicted of an offence against "*The Slaughtering Act of* 1898" or these Regulations, is on a second or subsequent occasion convicted of an offence against such Act or Regulations, the Court, by or before whom he is so convicted as last aforesaid, may, in addition to the punishment for such offence, order the license of the slaughter-house to be suspended for such time as the Court thinks fit, or to be absolutely cancelled, and such license shall be so suspended or cancelled accordingly.

FIRST SCHEDULE.

APPLICATION FOR A LICENSE OR THE RENEWAL OF A LICENSE OF A SLAUGHTER-HOUSE.

"*The Slaughtering Act of* 1898."

To the Licensing Court for the District of [*name of District*].

I [*or* we] hereby apply to the Licensing Court to be holden for the district of [*name of district*] for a license [*or* the renewal of a license] of a slaughter-house proposed to be established [*or* established] at [*describe locality so as to clearly identify it*].

Dated at the day of

Applicant.

SECOND SCHEDULE.

RECEIPT.

"*The Slaughtering Act of* 1898."

I have this day received from [*name of licensee or licensees*] the sum of £ , being fees in respect of stock slaughtered at the slaughter-house at [*situation of slaughter-house*], whereof he is the licensee [*or* they are the licensees], between the day of and the day of .

The particulars of the stock are as follow:—

Cattle [*insert number*]
Sheep and Calves [*insert number*]
Swine [*insert number*]

Dated at the day of

Inspector.

THIRD SCHEDULE.

SLAUGHTERING BOOK.

Date of Slaughtering.	Number of Stock Slaughtered.			Person from whom Stock obtained.	Brands or Marks.
	Cattle.	Sheep.	Swine.		

REGULATIONS UNDER "THE SLAUGHTERING ACT OF 1898."

Department of Agriculture,
Brisbane, 15th November, 1899.

HIS Excellency the Lieutenant-Governor, with the advice of the Executive Council, has, in pursuance of the provisions of "*The Slaughtering Act of* 1898," been pleased to make the following additional Regulation.

J. V. CHATAWAY.

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32. Clause 12 of the Regulations under "*The Slaughtering Act of* 1898," dated the twenty-fifth day of May, 1899, and published in the *Government Gazette* dated the twenty-seventh day of May, 1899, is amended by the addition of the following paragraph:—

Provided that the annual fee payable in respect of such license or renewal of such license issued to persons who only slaughter calves and pigs, but not exceeding five head in all in any week, shall be two shillings and sixpence.

By Authority: EDMUND GREGORY, Government Printer, William street, Brisbane.

Agriculture.

MARKET GARDENING.

BY A SUBURBAN AMATEUR.

It has often been a source of wonder to me why the people of Brisbane and other cities of this land of rich soil, perfect climate, and easy means of communication with the surrounding farming districts should be dependent on the Chinaman for a regular supply of vegetables. I therefore determined to investigate the matter for myself. Having been one of the pioneer farmers of the Oxley Creek in the early sixties, when boatloads of vegetables were daily taken to Brisbane and sold readily in bulk at the market wharf on the North Quay, I failed to see why the farmers did not continue a business which used to be a most lucrative one. I have very little land attached to my house near Milton, and of that land I found I could only devote 1⅓ perches to a vegetable garden. The soil consisted of a very gravelly loam. It contained so much gravel, indeed, that after a heavy shower quartz and shale could be raked off in quantities. About a foot below this was a stiff yellow clay over a foot in depth resting on rock. In June, 1899, this patch was covered with stunted buffalo grass. I cleared off the grass, dug the land up to a fork's depth and manured it heavily with well-rotted stable manure. In the centre of this garden I had a water-pipe which was supplied from Enoggera. I divided it into seven beds, the largest of which measured 6 feet by 14 feet, and the smallest 4 feet by 4 feet. The area of the land available for cultivation measured 442 square feet, or as nearly as possible 1⅓ perches.

Having got the soil into good tilth by the middle of June, I sowed cabbage, lettuce, peas, French beans, butter beans, Madagascar beans, radishes, carrots, and eschallots at a cost of 1s. 9d. for seed, the whole of which was not sown at once. Then I set out borders of mint, thyme, sage, marjoram, and parsley. A month later, in the middle of July, I planted out some onions and leaf artichokes given to me by a farmer at Westbrook. In August, having still a little room, I planted a few potatoes in vacant spots, and set out tomato plants in a line with the fence. In September, the cabbages and lettuces were ready for planting out, and I made room for these, and also sowed a few grain of corn to have some "mealies" for cooking.

At the end of this month, a few more French beans were sown; also rock-melons, cucumbers, and a few rhubarb crowns.

The land was now fully stocked, there was not a square foot unoccupied, and on the 10th of August the returns began. From that date to the 22nd January, 1900, a little over five months, the crops gathered were as follow:—Radishes, 83 bunches; onions, 17 lb.; butter beans, 10½ lb.; Madagascar beans, 1 lb.; potatoes, 10 lb.; tomatoes, 69 lb.; French beans, 54½ lb.; lettuce, 164; cabbages, 30; cabbage plants, 300; carrots, 81 bunches; eschallots, 41 bunches; peas, 2½ pecks; artichokes, 43; cucumbers, 30; rock-melons, 3; rhubarb, 2 bunches; turnips (self-sown), 2 bunches; quantity herbs.

From 22nd January to 25th March, 1900, the returns were—Carrots, 6 bunches; radishes, 5 bunches; pumpkins (self-sown), 3 (14 lb.); tomatoes, 2 lb.; rock-melons, 3; cucumbers, 9; cauliflower plants, 434; cabbage plants, 153; butter beans, 4 lb.; and a quantity of herbs.

From 25th March to 25th May the returns were—Carrots, 27 bunches; radishes, 14 bunches; rhubarb, 1 bunch; lettuce, 9; cabbages, 3; peas, 1 peck; cabbage plants, 225; cauliflower plants, 34; onion plants, 150. And the garden is still stocked with well-grown carrots, turnips, yams, tomatoes, chili peppers, herbs, radishes, lettuce, peas, and a few onions.

In addition to the vegetables, I got 4 lb. of tree tomatoes from a tree growing in the centre of one of the beds, and 75 lb. of Isabella grapes from a vine growing from the garden and trellised along the veranda.

Behind the vegetable garden is a small yard, about 16 perches in extent. Here I keep my poultry. The few hens I can keep have averaged four dozen eggs a week; and I raised thirty-eight chickens, in addition to twenty cockerels killed for the table. Certainly, the fowls have a neighbouring open paddock to run in.

I now come to the value of my produce from a money point of view. I spent altogether 6s. in seeds, 4s. in stable manure, and 2s. on bonedust, besides obtaining occasional plants from neighbours. As for the labour expended, it may be understood that a little over a perch of garden would not require much hard labour; yet I found I could spend a couple of hours before breakfast and an hour or so in the evening, with great profit and pleasure, in weeding, watering, sowing, transplanting, sticking, &c. But there was no actual expenditure in cash for labour.

Putting the prices of my vegetables at the same figures which I used to pay the Chinaman gardener, I find that the result from 10th August, 1899, to 22nd January, 1900, was—Vegetables, £3 18s. 10d.; grapes, £1 5s.; eggs, £4; fowls, £1 5s.; roosters, £1 10s.; or a total for the six months of £11 18s. 10d. From 22nd January to 25th March, 10s. 5d.; fowls and eggs, £1 1s.; from 25th March to 25th May, 5s. 2d.; fowls and eggs, 13s. Total, £14 8s. 5d.

Now, I am not sanguine enough to say that if one perch will produce £10, therefore 160 perches (one acre) will produce £1,600. If that were so, then market gardening would be better than Mount Morgan shares. All I wish to emphasise is that on a very small piece of ground, with care and the expenditure of just enough labour to give a man a little exercise before and after working hours, sufficient vegetables can be grown and eggs produced to supply the household. And there is this advantage about home gardening—the grower knows that his vegetables are wholesome, and not grown by the help of all sorts of abominable garbage.

LIME.

ITS FUNCTIONS AND USE IN AGRICULTURE.

By A. ALEXANDER RAMSAY,
Manager of the Sugar Experiment Station, Mackay.

THE use of lime in agriculture has been since the earliest times. Pliny mentions the use of this by the people of the Trans-Alpine Gaul, also in Italy, when it was used for manuring the vine, olive, and cherry. In the earliest writings on agriculture in Britain (1534), little mention is made of lime, and we may conclude that it was little used. It is not till much later that extensive mention is made of it, and at the present time its use can scarcely be said to be general, being more confined to localities. Pussey says that lime is considered indispensable on the west side of England, and is generally found useless elsewhere in that country.

On this subject of lime and its application, one finds many different opinions expressed, and, as these are all the result of practical experience in each case, one can perhaps account for these differences when it is remembered that lime may act in such a variety of ways, bringing about the most complicated changes in ways which are as yet not thoroughly understood.

Lime may be looked upon as a plant food—and a necessary one, in so far as it is found in the ash of almost all plants, though when applied as a manure it is principally used, not to supply the plant with lime for its structure, but on account of changes it effects, which will be explained hereafter.

Perhaps, before proceeding further, a short account of the chemistry of lime might not be out of place.

Lime is a salt or compound of a metal calcium, the compounds of which occur very widely distributed. One of the principal of these is "limestone," which is a more or less pure form of calcium carbonate (a compound of calcium with carbonic acid).

Other forms of calcium carbonate are shells, corals, and earths known as marls.

Other compounds of calcium used for agricultural purposes are "gypsum" (a compound of calcium and sulphuric acid) and "gas-lime," which is lime which has been used in the gasworks to remove sulphurous and other impurities, and consists essentially of a mixture of slaked lime, calcium carbonate, and calcium sulphate.

When limestone is heated, it parts with a gas carbonic anhydride, and quicklime (calcium oxide) is formed. This process is carried out on a large scale in kilns, where the heat from burning wood is used to effect the reduction of the limestone to quicklime.

Quicklime has a great affinity or liking for water, and forms with it calcium hydrate or slaked lime. This action is so violent that great heat is produced.

Slaked lime has the power of combining, with the gas, carbonic anhydride, which is always present in the air, forming calcium carbonate.

The changes of quicklime to slaked lime and of slaked lime to carbonate will occur in the soil when lime is used.

Opinion differs considerably as to the class of lands most benefited by the use of lime, and also as to its application; German writers urging its application to heavy lands, while French writers recommend its use on open light soils.

In many localities the use of lime has been proportionate to the facility with which it could be obtained, and as examples of the very great benefits derived from the use of lime might be cited the soils of the French province of Limousin, and, what is perhaps better known, the soils of Hawaii as treated by Dr. Maxwell. In the application of lime to soils, one well-known authority recommends that lime be harrowed in and not ploughed, while Professor Storer says that theoretically lime had better be ploughed in than harrowed. The general practice is, I think, to harrow in, since the fact that lime will sink through the cultivatable soil into the subsoil, or go off in the drainage water, has been noted by many.

As to the quantity of lime to be applied, opinion and customs differ, but heavy dressings, except in particular cases, are now discouraged; the idea being to apply a lighter dressing oftener than a heavy one at much greater intervals.

In England, the old practice was to apply 4 to 8 tons lime per acre, though in Derbyshire as much as 16 tons has been applied. This application was made about once in sixteen years, but the general practice seems now to be an application of not more than 1 or 2 tons per acre every six years.

Instances have been recorded where the practice of applying 6 to 8 cwt. lime per acre, when the land had been prepared for seed, and before sowing the grain, has given most satisfactory results.

From experiments made by Scott and Morton, the application of lime is recommended of from ·05 to ·50 (according to circumstances) per cent. of weight of the cultivated soil. Thus on an average soil cultivated to a depth of 10 inches, an application of 1 ton per acre would represent ·05 per cent., and 10 tons per acre a dressing of ·5 per cent.

Hilgard recommends that for lime-loving plants the percentage of lime should be not less than ·10 if soil be light sandy; ·25 if soil be clay loam; ·50 if heavy clay, and may advantageously rise to 1 or even 2 per cent. Beyond this last-named amount, it seems in no case to act more favourably than a less amount, unless it be mechanically.

West Indian authorities state that good cane soil should contain ·4 to ·9 per cent. of lime.

Paradoxical as it may seem, it is none the less noteworthy that liming often does good service on lands which already contain no small quantities of lime salts.

It is stated by Hilgard that the general effect of a large percentage of lime on vegetation is to encourage a low compact growth and increased fruitfulness, whilst a deficiency of lime in a soil otherwise of good composition produces a thin growth and diminished fruitfulness. In support of this, the low compact forms of the trees in Western California, Oregon, Nevada, and Arizona are cited, due probably less to the parching influence of the sun than to the high percentage of lime in the soils.

Spring or autumn is recommended for the application of lime. In deciding which time is most suitable, it must be remembered that rain exerts a great leaching action upon lime salts, as appreciable quantities of these are found in the water from field drains. Recent investigations of Heiden show that nine times as much lime was dissolved by water from soil limed at the rate of 14 tons per acre, as from the unlimed soil. The experiment was made six months after the lime had been applied.

The action of lime upon soils is partly chemical and partly physical. As to the first, lime has the power to liberate certain insoluble and inert ingredients in the soil—potash, soda, &c., &c.,—which are of great importance for plant foods. Fuchs and Zierl have shown that if powdered felspar be digested with milk of lime, even at ordinary temperatures, much of the potash in the mineral will pass into the water, and its place be taken by lime. This power depends on the chemical condition of the lime, caustic lime being more powerful than the other forms. Stoeckhardt has further investigated this, and has shown that caustic lime attacks not only felspar, but also produced quartz, forming a hydrated silicate of lime.

Lime promotes the formation of double silicates of alumina from the clay, which is chiefly composed of silicate of alumina. A portion of the alumina can be replaced by the compounds potash, soda, lime, and ammonia, forming these "double silicates," which act as reserves of plant food. According to the generally accepted theory, it is in this form that much of the available mineral plant foods are retained.

Hilgard argues that the presence of calcium carbonate in the soil must be of great importance for maintaining fertility, because it promotes the formation of the more soluble silicates, called zeolites. Lime decomposes vegetable matter, setting free the inert nitrogen, which may become available as plant food. Lime might profitably be used as an adjunct to green manuring, in which case it should be well worked into the field when freshly slaked. It may be remarked that lime must not be mixed with ammoniacal salts—for example, sulphate of ammonia—since a loss of ammonia will take place.

Lime combines with certain organic acids which, when produced in large quantities, render the land what we term "sour" By removing this sourness by neutralising these acids with lime, the general conditions of such soils are much benefited, and many of the forms of plant life which exist on such a soil are killed out, their place being taken by others of a finer nature. Killern has shown that lime sometimes acts upon phosphates, making them more readily available for plant food.

Regarding the physical action of lime on soils, lime has the power of causing the coagulation of small particles of soil (clay), thus causing the formation of larger channels for the passage of air and water. Any farmer can prove this for himself by repeating the experiment made by Schloesing, who found that the extremely fine particles of mud in a mud-puddle which will not settle can readily be made to do so by the addition of a little lime water. Though some other salts will effect this cleaning, Schloesing and Hilgard find none so effective as limewater.

In stiff clay soils the particles are very fine and very closely packed together, so that water can only with great difficulty percolate through such. The effect of lime on such soils is clearly shown by Pearson, who took three samples of

different clays, and added to each ·25, ·5, and 2·5 per cent. of lime. He then noted the time that 2 inches of water took to percolate through 2 inches of each of these mixtures. The results were as follow :—

	A.	B.	C.
Clay...	6 days	12 days	26 days
Clay + ·25 per cent. lime	12 hours	10 „	8 „
Clay + ·50 „ ...	10 „	5¼ „	2½ „
Clay + 2·50 „ ...	3 „	8 hours	7 hours

In soils that have a tendency to puddle and set hard, this tendency is lessened by the use of lime. In this connection, Hilgard's experiment is most convincing. He says that, if any clay soil be worked into a plastic mass with water and dried, the result will be a mass of almost stony hardness, but on adding to some of the same paste no more than ½ per cent. of caustic lime a diminution of plasticity will be obvious at once, even while the clay is wet, and on drying, the mass will fall into a pile of crumbs at a mere touch. It is evident, then, that lime will render clay soils warmer, mellower, and of better tilth, and the effect of this lightening of heavy soils has been known to last for years.

Lime may promote nitrification, but, on the other hand, under certain circumstances, especially if applied heavily, lime will arrest nitrification. Warrington has shown that carbonate of lime is necessary to the effective working of nitrifying bacteria, and that good working will not take place without it. Still, quicklime is injurious, and heavy liming would possibly arrest nitrification till sufficient carbonic acid had been absorbed, or till the organic acids had neutralised the lime, when conditions would again become favourable for the nitrifying germs to work. Warrington's conclusions have further been confirmed by the results of Heiden and Voigt. It is now generally recognised that the addition of lime salts to the soil increases the power of that soil to retain potash, soda, &c., from solutions. The use of lime in preventing certain fungoid diseases, such as "finger and toe," "rust," "smut," and also to prevent the ravages of slugs, &c., has been often noted. One exception ought, however, to be remembered—the potato scab fungus which affects potatoes and beets. The action of lime seems to increase the activity of this growth.

The foregoing remarks show briefly the action of lime in altering the texture, increasing the permeability and power to retain certain plant foods in soils, preventing puddling, promoting nitrification, and liberating supplies of potash, &c., that may be locked up. While the action of lime on soils is as set forth, it might well be that injury would be done by its application to a soil containing small quantities only of clay, by decreasing the power of such to retain moisture. It will also be noted from the above that the liberation of potash, &c., presupposes the presence of these plant foods, though in an inert and not readily available state. The application, therefore, of lime alone will not add these plant foods to the soil. Lime is no substitute for a manure, but will fix plant foods that may be added, and reduce some of those already existing there in an inert state to such a condition as to be readily available for plant growth.

BROOM CORN.

The world's consumption of broom corn, according to the best authorities, is about 30,000 tons, and there can be no sudden increase, because it is only used for one purpose. This 30,000 tons is produced on 112,000 acres. Two-thirds of the broom corn of the world is grown in four counties of the State of Illinois, with Arcola as the most important shipping point. In favourable years these counties have produced 28,000 tons, or practically the world's supply. The territory and the men already engaged in broom-corn growing could easily double the present production if warranted by the demand. There appears, according to the *Breeders' Gazette*, from which these notes are taken, to have been a sudden

rise in the price of the product in the home market, but the price was not obtained by the farmers. The increase only came after the crop was practically out of their hands. Attracted by large quotations, many novices will plant extensively the coming year. The result will be an enormous over-production of brush, much of which will be of inferior grade. It is, and will always remain a little industry, because the demand is not only limited but small. Isolated individuals, and those remote from recognised methods, are at a serious disadvantage. To produce a ton of broom corn requires about three acres. The cost of production, under the best circumstances in the United States, is 50 dollars (about £10) per ton; the average selling price is about 70 dollars (£14) per ton, though it has sold as low as 30 dollars (£6). This is a crop requiring an immense force at harvesting, and a threshing gang numbering not less than twenty. The business requires a special outfit of tools and sheds, costing 800 to 1,000 dollars (£160 to £200), which are of little or no value for any other purposes. The crop is a precarious one that may be ruined by a few days of bad weather, and its successful growth and harvesting require a high degree of knowledge and skill.

SMUT IN BARLEY.

Is blue vitriol a preventive of smut in barley? asks a correspondent of the *Farmer and Stockbreeder*, to whom that journal replies:—Yes; sulphate of copper (blue vitriol or bluestone) is used as a preventive of smut in barley. One pound of sulphate of copper dissolved in 6 quarts of water is sufficient to dress 6 bushels of the seed. The crushed or ground sulphate gives less trouble to dissolve than when in the form of large crystals; therefore, if not already ground when bought, it is better to crush it at home previous to use. To prevent any loss it is advisable that the sulphate should be spread thinly inside a bag when pounding it with a hammer or wooden mallet, or it will fly about and some be wasted. Like sugar, it dissolves more readily if suspended in the water, or well stirred; very hot water will also hasten the dissolving, but, if used, requires to be cooled sufficiently before thrown over the seed. The sulphate of copper, supplied by Strawson, is specially prepared and requires no grinding, and is instantly soluble in cold water; this gives it a great advantage over the old kind. The quantity of seed which will be dressed at a time should be measured out and spread in a heap on a good floor, and the dressing sprinkled over it, during which time the heap should be stirred and immediately afterwards turned over several times; a brush should be used between the turnings, so that any scattered grains are swept to the bulk; none should be allowed to escape their share of the mixture. It is very important that every grain should be dressed properly, or some of the smut may escape destruction, and prove harmful in the crop.

EARLY RADISHES—UTILISING MANURE HEAPS.

On all farms and market gardens, heaps of manure are to be found—crude, fresh, and containing a large amount of heat. Now, this heat can be utilised by market-gardeners to get very early crops of radishes and other vegetables. A writer in the *Farmer and Stockbreeder* says on this point:—Advanced farmers—market-garden farmers in particular—habitually turn such heaps over, when large enough, to increase or prolong the fermentation, in view of reducing the bulk, and making it amenable to the more immediate requirements of future roots it is intended to supply with nourishment. Whether such heaps are turned over or not, they are an excellent site for crops of early radishes. Whichever plan is followed in furtherance of this intention, it is necessary to level down the heaps and extend them as far as they will go, leaving depth enough for some further amount of fermentation. Light, free soil to the depth

of about a couple of inches should then be spread over the whole, and the seeds promptly sown thereon. They must be well raked in to conserve them from birds, from which pests they may also require to be further protected. My experiences go no further than to enable me to say very fine examples of long radishes are quickly produced in this way, and the variety was Wood's Early Frame. Knowing, however, how well the French Breakfast variety grows, and how quickly it bulbs, there can be no doubt it would succeed under the same treatment, especially as it has the merit of bulbing well when grown thickly together. Even country growers, somewhat far removed from town markets, may make a profit from such a crop. Such crops may be readily sold in local villages. Such early produce would, however, be acceptable in the best markets, especially as the sample is invariably of good form and size and tender.

THE PROPAGATION OF RUST IN CEREALS.

(Translated from the French by A. J. Boyd.)

Rust in cereals has been observed in all ages. It was in the year 1767 that Fontana, an Italian botanist, discovered the fungus which was the cause of the disease, a fungus named later on *Puccinia graminis* by Person. The curious biology of this fungus was elucidated by the German botanist, de Bary, who proved by experiment that the different forms of one and the same fungus, corresponding to the different phases of its evolution, are developed, some (*Æcidium*) on the bramble, others (*Uredo*, *Puccinia*) on cereals.

However that may be, the evil did not cease to spread in the fields. England lost 15,000,000 in 1881, Austria 24,000,000 in 1886, Australia 50,000,000* in 1890, by rust in cereals.

In 1890 a series of scientific observations was organised in Australia; in the same year the Swedish Government entrusted the botanist Jakob Eriksson† with continued research on the rust in cereals, furnishing for the purpose a credit of about 14,000 francs.

Mr. J. Eriksson has just published in the *Revue Générale des Sciences* a résumé of his investigations since 1890.

There are as many as twelve different species of rust, besides which there must be reckoned a certain number of biological origin. Some of these forms do not present either to the naked eye or to the microscope any difference, but they differ materially from a practical point of view. In fact, each form of an identical species is invariably attached, "specialised," to the class of cereal which it attacks, and cannot be inoculated (communicated) to any but this particular cereal. It is thus that rye straw, attacked by the brown rust, can communicate the disease to rye, but not to wheat; that oat straw, attacked by the black rust, can communicate the disease to oats, but neither to rye, barley or wheat, and this even after having passed through the form *Æcidium* on the bramble.

Humidity and heat suffice for the germination of certain spores (æcidiospores, uredospores); for the germination of certain others (teleutospores) a third condition is required—a certain period of repose. These last, which require a whole winter for the awakening of their germinating powers, can only germinate in the spring following their formation, when they have been exposed to the air and under the conditions natural to the locality which are experienced in winter (cold, snow, and rain).

From this it results that rusted straw placed in the barns, or in the centre of stacks, does not constitute an element of danger for propagating the disease. The germinative power of the winter spores is, besides, of short duration; at the commencement of October this germinative power no longer exists; the spores themselves are dead. It, therefore, naturally follows that the straw of the preceding year is not to be feared as a factor in propagating the disease.

* The figures doubtless refer to bushels.—A.J.B.

† J. Eriksson, Professor at the Experiment Station of Albans, near Stockholm.—From *Le Progrès Agricole et Viticole.*

It appears that there is only one single exception to this rule, an exception presented by the black rust in wheat, which retains a germinating power (almost insignificant, it is true) after the lapse of two winters.

As a matter of fact, the power possessed by the fungus to propagate itself from one plant to another by means of spores transported by the wind or otherwise only exists in the case of very short distances, 10 to 25 metres.

From all these observations, the propagation of rust can scarcely be understood otherwise than on the supposition of the presence of an *internal germ of the disease.*

The method indicated to resolve this question is to cultivate grains of cereals very sensitive to rust in a well-sterilised plot. After several abortive attempts, Mr. J. Eriksson has observed cases of rust in vegetables cultivated under glass. He discovered in the protoplasm itself of the cereal special corpuscles, of an oblong form, slightly recurved, either single or united in each cellule.

In this *myco-plasmatic* state, the fungus lives in symbiosis with the cereal, and under the action of exterior agencies (plant food, heat, light) the two forms of life, hitherto intimately intermingled, separate themselves, these corpuscles first appearing and afterwwards an intecellular mycelium.

Thus, the discoveries of Mr. Eriksson in many important points modify the general ideas on the subject of rust, and without doubt will also modify the methods practised by practical men to combat the disease.

HOW MUCH WILL CORN SHRINK?

ALL farmers are aware that the longer they keep their corn the lighter it will get; hence it is to their advantage to get rid of the new crop as soon as possible, unless in the face of a rising market. In the autumn of 1898 an experiment was made by Professor Atkinson, at the Iowa experiment station, to ascertain the amount of moisture contained in an ear of corn. A crib was constructed upon the platform of a pair of scales, the scales so constructed that an exact register of the weight could always be made. Seven thousand pounds of corn were husked and placed in the crib on 19th October, 1898. The crib was 13½ feet long by 7½ feet wide. The corn was then weighed once each week for a year. During the first three months the loss was 630 lb., or 9 per cent. of the original weight. During the next three months, from 19th January to 19th April, the loss was 390 lb., or 5 per cent. of the original weight. During the next three months the loss was 220 lb. During the last three months the loss was 190 lb. The loss during the full year was 1,430 lb., or a trifle more than 20 per cent. This means that a bushel of corn weighing 80 lb., when husked like this sample, will weigh 64 lb. at the end of the year.

HOW TO DEAL WITH WEEDS.

"PLOUGH deep and plough them under," says one man. "Plough shallow and expose them to the sun," says another. Which is the better way? The man who wants to get his land into fine tilth will not be satisfied with one deep ploughing. After the first ploughing, he will harrow and cross-plough. But, having buried all the weeds at the first ploughing, he brings them all up again at the second, and trusts to the harrow to clear them off. But whilst piles of weeds are removed in this way great quantities lie half-buried with their roots wholly or partly covered, and a third ploughing and more harrowing will scarcely see the end of them. By shallow ploughing, say to a depth of 4 inches, the roots are left exposed to the sun and wind, and then get thoroughly killed, when they may either be harrowed off or ploughed in at the next deep ploughing. Weeds should never be allowed to ripen their seed. If the

weather will permit, they should either be mown down or exposed to the atmosphere by shallow ploughing before the seeds have ripened; thus there will be very little of a second crop of pests to worry the farmer at planting time. Some people have asked how to banish weeds from the land. They might as well ask how to banish dust from their houses. So long as certain plants have seeds provided with downy wings, as are the thistles, wild cotton, and others, so long will the farmer have to continue his warfare against the weeds. Without weeds a farm would become a sort of elysium, which would reduce the sturdy British or Australian farmer to a state of inglorious ease, and life would eventually become so irksome, for want of employment for himself and his horses whilst his crops were growing, that he would soon be found wishing for some pest to fight. If all plant and animal parasites were extirpated, and all weeds banished, thousands of people would be thrown out of work, produce of all kinds would be so plentiful that prices would not enable the farmer to pay wages, and thus things would be generally upset all the world over. Thus weeds, which, after all, are only plants useful or otherwise in the wrong place, exercise a beneficent influence unless they happen to be of the nut-grass type—ineradicable and good for neither man nor beast. And this brings us back to the question, How to deal with weeds. We have shown how to deal with ordinary weeds, but the man who will tell us how to deal with nut-grass is, so far, amongst the nations yet unborn. Still, as that cactus pest, the prickly pear, appears at last to have found a human enemy capable of utterly destroying it, so another wise man may arise equal to the more difficult task of coping successfully with nut-grass. The Curator of the Brisbane Botanic Gardens has met with much success in keeping it down in those grounds, but the pernicious little nuts are all there, only waiting for a slacking of vigilance to deck the flower beds with a dense and beautiful covering of green.

AGRICULTURAL SCHOOL, CEYLON.

WE take the following from the report in the *Agricultural Magazine*, Colombo, of the annual prize-giving of the institution. The principal's report dealt, amongst several matters of local political interest, with the past, present, and future of the school, and some of his remarks will be of interest to Queenslanders for comparison with the position of the Queensland Agricultural College at Gatton.

"As regards numbers," he said, "our largest number on the roll last year was twenty-two, and the average for the year sixteen.

"These are rather below the normal: the full complement being twenty-five, and the usual average twenty. The decrease is to be attributed to the uncertainty attaching to the future of the school. Indeed, the wonder is that, under present conditions, our numbers are what they are. In India, with greater inducements for the study of agriculture, and with prospects of employment to trained students, there are instances of the attendance at agricultural classes being far more disappointing. Were we only half as fortunate as our sister institutions in India as regards financial aid, provision for a thorough course of training, and inducements offered to students, the School of Agriculture would be rather a different institution to what it is.

"On the results of the final examination held last November, three students became entitled to the first-class certificate of merit granted by the Department.

"Veterinary training continues to form part of the school course, and already three old boys of the school have fully qualified as veterinary surgeons, while two others have lately been appointed as stock inspectors. The present Government veterinary scholar is J. E. Fernando—also a late student of the school—who left for Bombay at the end of last year to prosecute his studies at the veterinary college there. He succeeded Veterinary-Surgeon Chinniah, who, with commendable enterprise, started practice in Colombo on his own account—a departure which, I believe, he has no reason to regret.

"The other institutions (the existence of which few persons are aware of) located in this building, are the Government training and practising schools and the school of forestry. But of these I have no excuse to say anything to-day. The Government dairy, however, is more intimately connected with the school of agriculture, and I am able to report that it has been working satisfactorily during the past year. We have now in the dairy 82 cows, 72 calves, and seven bulls, or a total of 161 animals.

"The net profit from the dairy on last year's working was nearly R2,500, while that from the model farm exceeded R3,000. In addition to this, a sum of R4,337 was realised by the sale of stock, principally young stock bred on the farm. The dairy has now paid back to Government the sum of R11,500 advanced for working of the concern; over and above which it has refunded a sum of nearly R13,000, against an initial expenditure of R19,539 on buildings and equipment. But then our stock-in-trade was at the end of last year reasonably estimated to be worth R13,500, a sum, which, I think, the most cautious speculator would be willing to give for it. But, while all this is very satisfactory, the School of Agriculture, of which the dairy is an offshoot, derives no advantage by the prosperity of the latter."

LIME IN AGRICULTURE.

As corroborating the article in this issue of the *Journal* on the value of lime in agriculture, we quote the following from the *Tropical Agriculturist*, Colombo :—

On Lord Rosebery's Scottish estates at Dalmeny Park, a thoroughly well-equipped experimental station was established in the spring of 1895, with Mr. Hunter as scientific adviser, the practical work being under the personal supervision of Mr. Drysdale. Part of the station was devoted to testing the relative productiveness of different varieties of grain, potatoes, &c, another part was devoted to bacteriological research work, and the remainder of the station was worked as a miniature farm on the four-course rotation, each section being subdivided into sixteen plots, which were all differently manured on a regular system. A good-sized volume would be required to detail the results, which have been most consistent throughout, obtained at this station in the last four years, during which time the station has been annually visited by hundreds of deeply interested agriculturists. A few of the more notable results may be briefly summarised. In the first season the beneficial results of a small dressing of ground lime were so marked that the system of applying to every field on the farm an annual dressing of 4 cwt. of lime was commenced, and has been continued ever since. In order that the small dressing should be equally distributed over the soil, Mr. Hunter procured ground lime—*i.e.*, ordinary burned lime shells mechanically ground to a fine state of division. At first this ground lime was applied in the compost form, but the second year's experience showed that it was equally effective and less costly when applied direct in the hot state when the land was being worked, the small quantity of hot lime applied being insufficient to injure the nitrifying and other soil organisms, besides being rapidly converted into the carbonate form when worked into the soil. It was also found that when the lime required by the nitrifying and other soil organisms was thus supplied, the plots which had received their nitrogen in the form of sulphate of ammonia showed much better crops, alike as to quantity and quality, than were obtained from plots which got their nitrogen in the form of nitrate of soda. Mineral superphosphate, supplemented in the case of the potato and root crops with fermented bones, proved the most satisfactory form of phosphate. The Dalmeny experiment also emphasised the importance of potash for every crop, particularly the leguminous, potatoes, and root crops. With a moderate dressing of farmyard manure, supplemented with 4 cwt. of ground lime applied at the working of the land, and followed by 4 cwt. of superphosphate, 1 cwt. of fermented bones, 2 cwt. of kainits, and 1 cwt. of

sulphate of ammonia, the Dalmeny home farm produces crops which are the admiration of all who see them. Another most important branch of investigation was in regard to the destructive pest of finger-and-toe in turnips, a pest which had previously baffled the skill of experimenters. The Dalmeny experimenters knew that a heavy dressing of caustic lime would kill the germ of finger-and-toe, but it would also kill the nitrifying and other advantageous soil organisms, while, on the other hand, a small dressing of 4 cwt. per acre would be insufficient to kill the disease germ. They therefore steered a middle course so as to avoid the Scylla on the one hand and the Charybdis on the other, by applying one ton of ground lime per acre when the land was being ploughed in the autumn, and another ton per acre when the land was being worked in the spring. In this case they rigidly avoided the use of dissolved phosphates, and used undissolved phosphates supplemented with 8 cwt. kainit and 1 cwt. sulphate of ammonia. This treatment proved a complete success, and the root crops grown by this system on infested soil were found to be sound and good, while those grown on the same soil under different treatment were so rotten as hardly to be worth removing. It was noted, however, that, though this treatment was successful in eradicating the disease, the crop was decidedly smaller than that grown on uninfested land to which only a tenth of the same amount of lime had been applied. A word in conclusion may be added as to the far-reaching effect of the Dalmeny experiments. When these experiments were commenced, ground lime for agricultural purposes had never been heard of, whereas now there are at least six limeworks where extensive grinding "plant" is kept hard at work to supply the ever-increasing demand for that substance. Since the principles of the New Soil Science have been put in successful practice at Dalmeny, the scientific authorities, who at first had branded these principles as absurd heresies, have changed their tune, and in the recently published volume of the Highland Society's Transactions, the chemical adviser of that society has unreservedly declared his acceptance of these new doctrines. Great credit is due to Lord Rosebery for not only providing the means of carrying on this important research work, but also for throwing his home farm and experimental grounds open for the inspection and information of agriculturists.

TOMATO DISEASES.

Tomato diseases have become very common of late years, and it therefore behoves every grower of this popular fruit to be able to recognise the early symptoms of various troubles, so that remedies may be applied before the diseases have obtained a strong foothold. Root knot is generally caused by eelworms, which form galls or irregularly swollen diseased growths on the roots, resulting in the wilting and death of affected plants, which should be burned, the soil in which they have been grown being either carefully burned or sterilised with quicklime. The sleeping disease of tomatoes, caused by an internal fungus parasite, is surely indicated by the drooping of the leaves successively from the base of the plant upward, increasing day by day, and sometimes accompanied by discolouration. At this stage the woody parts of a split root show a dingy yellowish-brown hue, more pronounced five or six hours after being cut open. Infested plants should be burned, and the soil in which they have been growing cleared out and sterilised by being mixed with quicklime. In cases of tomato-blight, the fungus-infested foliage shows rusty, yellowish spots, and the edges of the leaves often curl downwards before the foliage shrivels and dies, leaving the stems bare. Spraying with Bordeaux mixture directly the first indications of disease are observed, and the removal of the badly affected plants, are effective remedial measures. The tomato-rot-fungus generally attacks only over half-grown fruits, the first symptoms being the appearance at the blossom end of a small black spot, rapidly increasing in size until half the affected fruit is sunken, black, and destroyed, the injury usually extending uniformly from side to side across the tomato. The crop also

suffers from a physiological trouble, a kind of tomato dropsy, visible in swellings on both leaves and stems, and in the curling of the former. This disease results from an excess of water inthe tissues of the plant, and is encouraged by insufficient light, and by injudicious watering, especially in dull weather.—*Tropical Agriculturist*, Ceylon.

PEANUT OIL.

THE United States Consul at Marseilles, in one of his late despatches, quotes portions of correspondence on the subject of peanut oil by several authorities. The substance of their remarks is that the oil of the *Arachide* (Earth or Pea Nut) has no special adaptation. It is the most polymorphous of all oils, adapting itself to all purposes, including nutrition, lighting, lubrication, and blending. It is the most difficult to detect when mixed with olive oil, because its chemical reaction is white. There is no likelihood that it will ever be driven out by cotton oil. Its future depends upon African and Indian crops. The best qualities of the oil are used for table purposes, either pure or mixed with olive oil or sesame oil. As an illuminant, it gives a soft white light. When neutralised it is highly valued for lubricating purposes. At even prices, peanut oil is always preferred to cotton-seed oil. It can be used in every industry and department of business when it can compete in price with other oils. Its principal uses are for human consumption, as in salad oil, artificial butter, for mixing purposes, as an illuminant and lubricant, and for the manufacture of soap. Peanut oil is the real type of the famous Marseilles white soap.

The receipts of peanuts in Marseilles during the last three years were as follows:—In 1897, 8,355 tons of shelled, and 31,888 tons of unshelled; in 1898, 5,466 tons shelled, and 63,286 of unshelled; 1899, 9,579 tons shelled, and 61,241 of unshelled. More oil is extracted from oleagmous seeds in the city of Marseilles than in any other trade centre in Europe. During certain years, the African crop of peanuts has been entirely swamped by Indian supplies, and at one time it seemed as though Africa would be unable to compete with India permanently. India continues to be an important factor. Statistics would seem to indicate that new demands have been created for oils of all grades. There are now no stocks of oil seeds or of oil at Marseilles. America is consuming vastly greater quantities of cotton oil than heretofore, and with a world-wide decrease in the amount of animal grease, which must be made up by vegetable oils, there would seem to be assurances of profitable prices.

In conclusion, the Consul says: "I am disposed to believe that the trade in Marseilles will not so much speculate on the prospect for success of American enterprise in this field as it will wonder why the effort has been so long delayed." The above is abridged from the *Californian Fruitgrower*.

With regard to the cultivation of the peanut in Queensland, we cannot do better than refer our readers to an interesting article on the subject by Mr. Charles Batten, of Pimpama, which appeared in this *Journal* in July, 1899, showing that the peanut plant bears heavily in this colony, and that 3d. per lb. can be obtained in America. They would have to be exported, as there appears to be a very limited sale for the product in Queensland.

PEANUTS FOR NEW GUINEA.

Mr. Theodore Wood, late resident magistrate and member of the New Guinea Executive Council, writes:—Peanuts are likely to prove a remarkable success in British New Guinea, certain portions of the Possession being eminently adapted for their cultivation. The first plantation is fairly underweigh, and the first crop is now being taken off it; and, so far, the samples we have seen are equal to the best that are grown elsewhere. As far as can be at present judged, the class of land in British New Guinea upon which peanuts are likely to thrive should yield at least 4 tons to the acre; and, given favourable seasons, the planter may

fairly expect to take off two crops *per annum*. Suitable land can be obtained from the Government in fee-simple at a cost of 2s. 6d. per acre. So far, native labour only has been employed at a wage of £3 per annum. The cost of food and clothing is a mere bagatelle, the latter item consisting of a bit of calico round the waist, while the former article is grown in the country, and, on an average, a pound's worth of common tobacco will suffice to purchase native produce sufficient to feed 50 men for a month. It is, of course, presumed that the planter possesses an 8 or 10 ton lugger to utilise as a tramp for buying food at different islands. The cost of building houses, &c., is included in the cost of labour, for the natives have all been accustomed to this work, and run up houses, native fashion, rapidly. The buildings are amply sufficient for all *necessary* purposes. Under such advantages as these, peanuts ought to become a thriving industry in the very near future in British New Guinea.

REPORT ON WORK CARRIED OUT AT THE QUEENSLAND AGRICULTURAL COLLEGE.

APRIL, 1900.

THE farm at present looks well, although suffering somewhat from want of rain. Although the total rainfall for the month amounted to 2·24 inches, the whole of this fell during the first ten days, and, a succession of westerly winds ensuing, a great portion of the moisture was dried up.

The crops, however, are healthy, especially the potatoes, which cover an area of nearly 33 acres, including about 4 acres treated with manures for experimental purposes. In the latter, the unmanured crop appears even better than the manured. As regards the other root crops, a large amount of the seed has germinated, but some has not done so and requires rain badly. The lucerne, however, looks remarkably well, and will yield a good return within the next fortnight.

Wheat experiments, under treatment with various manures and under similar conditions as to time of sowing and implements used, were begun on 27th April. The wheats chosen were Allora Spring and Belatourka. They were planted with the Massey-Harris seed-drill at different depths, as detailed below, and manures calculated to produce the best results were applied. The land sown was that bordering on the Tarampa road. As the results of these experiments may be interesting to many, it may be as well to give details:—

Plot 1.—Allora Spring: Pickled with bluestone; 1 acre; 20 lb. seed (per acre); 2 inches deep.

Plot 2.—Allora Spring: Pickled with bluestone; 1¼ acres; 30 lb. seed; 1 inch deep.

Plot 3.—Belatourka: 3 cwt. superphosphate; 1 cwt. kainit (mixed); 1 acre; 25 lb. seed; 1½ inches deep.

Plot 4.—Belatourka: No manure; 1 acre; 25 lb. seed; 1½ inches deep.

Plot 5.—Belatourka: 122 lb. unslaked lime; 1 acre; 35 lb. seed; 1½ inches deep.

Plot 6.—Belatourka: Pickled with lime; 1 acre; 30 lb. seed; 1½ inches deep.

Plot 7.—Belatourka: Pickled with bluestone; 5¾ acres; 25 lb. seed; 2 inches deep.

The bluestone pickle consisted of ½-lb. of bluestone crystals dissolved in a little warm water and added to 1½ gallons of cold water, applied to each sack containing 4 bushels of seed. The lime treatment was carried out with 8 lb. of unslaked lime mixed with 4 gallons of water. The seed in a sack was allowed to remain in the liquid for three hours.

The root crops, above referred to, are distributed as follow:—

	Acres.
Planted 6th April—	
Carrots, White Belgian	1
Carrots, other varieties	½
Swedes, Kangaroo Purple	½
Mangels, Mammoth Long Red	1
Onions, Brown Spanish	½
Onions, Giant	½
Planted 17th April—	
Sugar Beet, Vilmorin's Improved	1
Mangels, Champion Yellow Globe	¼
Imperial Prize-winner (Mangels)	½
Chicory, Large Rooted Magdeburg	¼
Planted 20th April—	
Flax	¼
Buckwheat	¼
Turnips, Aberdeen Purple Top	¼
Swedes	1½
Total area under miscellaneous crops	8¼

These root crops were treated with manures, &c., on experimental lines—*e.g.*, a load of stable manure, a load of ashes, and a chemical fertiliser were applied to the drills respectively in the order given: for purposes of comparison, some drills were left without any manure. The fertiliser consisted of superphosphate (400 lb.), and kainit, common salt, ammonia sulphate, each 66 lb. per acre. A combination of ashes and fertiliser was applied to the Brown Spanish onion plot.

The following additions have been made to the live stock at the College:—A handsome bright bay Clydesdale stallion, Black Watch, 2½ years old, recently obtained from New South Wales. He is adapting himself to the climate, doing remarkably well, and is very much admired by those competent to judge. A silver-grey Jersey bull and Guernsey bull and heifer have also been imported from New South Wales, and are looking well. A Romney Marsh ram, purchased from the Hawkesbury Agricultural College, has arrived, and a selected flock of ewes will be here shortly. Two young Large Yorkshire pigs have arrived in first-class condition, and will prove a valuable acquisition to the fine herd of pigs at the College.

The results obtained from the different breeds and crosses should be of interest to the farming public of Queensland, as there are now the following breeds dealt with experimentally:—Tamworths; Large, Middle, and Small Yorkshires; also some of the best Berkshires procurable in Australia. Records of results obtained will appear from time to time in the *Journal*.

An officer from the Stock Department has inoculated the College dairy herd for tick fever, and has also subjected it to the tuberculin test. There are about 18 very fine young bulls, of various breeds, for sale; these will be sent to the Brisbane Exhibition in August next, and intending purchasers may rest assured that the College cattle are quite free from disease of any kind.

In the mechanical department progress is being made. A calfpen building (30 feet by 22 feet) has been erected: it contains five small pens (6 feet 6 inches by 6 feet), also two large ones (10 feet by 15 feet), with a feeding gangway down the middle. It is a weatherboard structure with an iron roof. Light and ventilation are secured by sliding shutters. In connection with this, a lean-to shed has been built (30 feet by 8 feet) for housing small calves. During the month, the weighbridge has been removed and refixed in a much more convenient position on level ground, and adjacent to the recently erected farm-buildings. It has been placed in thorough repair; the whole of the ironwork painted and set in brick walls to support it. A considerable amount of fencing

has been erected. Raised loading-shutes for pigs have been set up, on the very latest principle and design; the loading of pigs is now a very simple matter. A shed has been built over the boiler at the pumping station on the bank of Lockyer Creek; dimensions, 26 feet by 18 feet.

In the garden, large quantities of vegetables have been produced for domestic purposes, and, to ensure the continuance of the supply, 3,500 young plants have been set out during the month. The seeds planted comprise:—

Carrots—Long Red Blood, Surrey, Perfection, Arlingham, Oxheart Gem, Chantenay, Improved Intermediate, Scarlet Perfection.

Parsnips—Hollow Crown.

Turnips—American White Stone, Red Stone, Imperial Prize-winner (Swede).

Transplanted.—Cauliflower—Improved Asiatic. Cabbage—St. John's Day, Beefheart, Drumhead. Seed Onions—Brown Spanish, White Tripoli, Improved White Queen, American Globe.

There were planted also the following varieties of Strawberries:—Hautbois, Federation, and Pink's Prolific.

Both garden and orchard are in splendid order at present, reflecting great credit on the energy and management of Mr. Cole, our new horticulturist.

In connection with the dairy, the average number of cows milked was 75. The quantity of milk treated during the period under review was 3,238 gallons; 1,913 gallons yielded 1,950 lb. of cheese, and 1,325 gallons gave a return of 538½ lb. of butter. Increase during the month was:—Ayrshires—1 male, 2 females; the Ayrshire cow, Lavinia, producing twins, 1 male, 1 female. Shorthorns—1 male, 1 female. South Coast-Ayrshire cross—1 female. Ayrshire-Jersey cross—1 female.

Amongst the pigs, the increase in pure breeds was:—Berkshires, 9 (1 boar, 8 gilts). Middle Yorkshires, 10 (6 boars, 4 gilts).

EXTRACTS FROM THE MONTHLY PROGRESS REPORT OF THE BIGGENDEN EXPERIMENT FARM FOR APRIL, 1900.

DURING April the weather has, unfortunately, continued to be extremely dry. The total rainfall amounted to only 1·25 inches of which 77 points fell on the last day of the month. Such abnormally dry weather has, of course, greatly militated against a healthy growth of the winter crops. The seeds either lie dormant in the ground or struggle for a bare living in a semi-starved condition.

Good progress, however, has been made with ploughing, which will be finished in a couple of days, including 3 acres for an orchard which we had last year subsoiled to a depth of from 18 to 20 inches, and which we are now ploughing from 12 to 15 inches deep with a Verity plough No. 2 and a team of three horses.

Over 100 varieties of wheat were sown between the 9th and 12th of April in the nomenclature, stud, and seed-wheats plots.

The nomenclature wheats were sown in drills half-a-chain long. The drills are 2 links apart, and the seeds carefully dropped by hand 1 link apart in the row.

For the stud wheats the drills are also 2 links apart, but they are 1 full chain long, and the seeds were dropped by means of a Planet Junior hand seed drill.

The seed wheats and barleys have all been broadcasted by hand in areas not exceeding 1 acre.

In this year's experiments we have purposely omitted all those Swedish, Russian, and other winter wheats which are well known to be entirely unsuitable to our latitudes and climate. This will allow us to concentrate our work on the best of hard (macaroni) wheats, which are usually good, rust-resistant varieties, and on those bread wheats which have been artificially produced in the southern colonies by a careful selection and crossing of the most suitable varieties. We have especially a fine collection of Mr. Farrar's wheats. We are fully

convinced that it is by working on the plan laid down by that gentleman and other eminent plant pathologists that we shall succeed in obtaining wheats perfectly suitable and adapted to the various districts of the colony.

One acre and a-half of lucerne has been sown in the north-east corner of the cultivation paddock, partly on subsoiled land and partly on land simply ploughed 8 inches deep. A small part of the seeds has been drilled in by means of a Planet Junior hand seed drill, and the remainder broadcasted by hand. A small quantity of barley has been sown thinly on the same plot, and the whole lightly harrowed. This should prove an interesting experiment, inasmuch as the land is far from being an ideal one for such a deep-rooted plant.

In accordance with the Honourable the Minister's personal directions during his visit here, I have broken up and fenced in a small plot of ground in the midst of the grass paddock, with a view to test the grazing value of some of our fodder grasses, such as *Paspalum dilatatum*, Mitchell grass, *Panicum colonum*, &c. The idea is to remove the fence after the plants shall have had time to make firm roots and yield seeds, and then let them be browsed down by our farm animals, thus showing exactly how they stand grazing in comparison with the surrounding indigenous grasses.

Successive sowings have also been made of cabbages, cauliflowers, turnips, radishes, lettuce, and other winter vegetables, but no transplanting could be done on account of dry weather.

During the month we have shelled most of our corn by means of a hand Globe Invincible double-hopper corn-sheller. The machine does very good work indeed. The cobs are greedily drawn in and thoroughly stripped of their grain. No pith is torn or twisted. But I was not so pleased with the shaker, which does not grade the corn. I removed it and made another, in which the two square-holed metallic sieves are replaced by three sheets of zinc perforated with round holes, ¼-inch, ½-inch, and ⅝-inch respectively. This works extremely well. The dust and other small impurities fall on the ground all along under the shaker. The small grains—good only for use on the farm—come out through a small shoot on the right side ; the large, well-graded seeds through a similar shoot on the left side ; whilst the stripped piths fall in front of the shaker. This is, I believe, as perfect an arrangement as can be made by a small farmer. By its means, he is enabled to put on the market an article as clean and well graded as the man who works hundreds of acres with steam and other improved corn-shelling machines. This device can also be used for separating cow-pea beans from the cow-pea chaff, although it is somewhat small for this purpose. But the principle is correct, and any farmer can make himself, for a few shillings, a larger one, say 6 feet long by 2 feet 6 inches to 3 feet wide, which would do the work both rapidly and efficiently.

To avoid choking, the sheets of zinc should be wider apart at the outlet than at the back. Ours are 1½ inches apart at the back and 2 inches at the outlet. They never choke.

We have also, during the month, given a few coats of paint to the American wagon, the dray, and other implements which were in need of it.

All the above works, as well as some odd jobs, such as repairs at the pump and windmill, have been made, without extra labour, by the usual farm hands (a man and a lad) with such help as I can give them after my office and other pen work are completed.

WHAT IS "KHAKI" CLOTH?
ITS BEARING ON AUSTRALIAN WOOLGROWERS.

THE special Bradford correspondent of the *Adelaide Observer* writes:—

"Tommy Atkins" is undoubtedly the man of the hour throughout the whole of the British domains, and the fact that he has gone forth dressed in a "bran new suit," as they say in Yorkshire, is sufficient in itself to arrest attention. But what is that new suit? And with the answer there comes the

words that have been and still are on the lips of everyone, and the word "khaki" is the subject of the hour. Khaki is of great concern to every wool-grower and those dealing in wool fabrics. Knowing this tempts me to say something about khaki.

The origin of the word is somewhat obscure, but it is thought to be derived from the name of a plant known as khaki, grown in the East Indies. I am unable to verify this origin, and therefore, for the time being, must accept the tradition without comment. The so-called khaki plant is said to have some of the characteristics of flax, producing a fabric of a brownish colour. As the supply of this material has been inadequate to meet the wants of the British army, a material in imitation of it has been made from cotton, and the name of khaki applied to it, the colour being obtained from dyes of a peculiar brownish or tan tint. Soon after the beginning of the American war with Spain experimental lots of this cloth were made up into garments for their soldiers in the West Indies, some of it of English and some of domestic manufacture. Without proper clothes a man cannot fight to the best advantage, a fact which the military authorities have borne carefully in mind as regards the soldiers intended for service in South Africa. The tight-fitting, costly uniforms in which Mr. Thomas Atkins appeals so strongly to the feminine portion of our population are the outcome of much artistic effort on the part of military tailors, and are admirably adapted to the piping times of peace, but when the day arrives for service in South Africa, or in any other part of the world where excessive heat is likely to enfeeble the men, the gay trappings must be laid aside in favour of more suitable material. That is the reason why our soldiers during the present campaign will wear the dark fawn-coloured "drill" familiar to most people as khaki. Another version of the fabric is that the word is derived from the Hindoo, and means simply dust or clay-coloured; but in the War Office sense khaki is elevated from the position of adjective to substantive, and refers exclusively to that drab-coloured material which was worn for the first time, probably, by some of the East Indian regiments. Throughout the Egyptian campaign it was used by our troops; and when the Guards arrived in London after the last expedition they were clad in the very garments which have already been served out to them again for service in South Africa. As they detrained at Waterloo last autumn, and marched through the cheering multitude to Wellington Barracks, it must be admitted that the mud-coloured tunics and breeches failed to appeal to the eyes of the people who had associated the brave fellows with that "thin red line" of glorious memory; but the outfit certainly possesses many advantages from the point of view of practical work. The soldiers themselves are anxious to exchange their present uniforms for the campaign outfit, owing to the increased comfort they will enjoy. Though strong and unshrinkable, the material is much more flexible than the customary cloth, and enables the man to use his weapons to greater advantage. Any soldier will tell you that the manual and firing exercises can be performed with much greater ease when khaki has been substituted for the tight-fitting and padded regulation tunic. In South Africa, as in the Soudan, there will be times when all officers and men must sleep in their clothes, boots, and accoutrements, and in these conditions a khaki suit is as superior to the average uniform as pyjamas to the frock coat and tweed trousers of the civilian.

The word "khaki" then simply represents a certain kind of wool cloth, the principal peculiarity of which is its tan shade, being in effect very similar in colour to our tan shoes which have been so popular during the past few years. Wool khaki cloth when analysed is very little different to the ordinary indigo blue serge which everyone is familar with, only that it is dyed a different colour. Really speaking then, khaki only represents a colour, simply being a drab, sandy shade, and it can be applied to either cotton, woollen, worsted, or even linen. Some seem to think that it is a new shade, but it is not so by any means. It has been in use in India for the past twenty-five years, while I believe in Australia it has been known and used for several years. The nights

in Egypt are cold, but dry; the khaki cotton clothing met every requirement, and to give the necessary warmth the soldiers wore woollen underclothing. The khaki cotton drill looked as if it had come to stay not only in Egypt, but in other parts of our Empire where heat had to be considered. It was speedily decided to use this cotton fabric in South Africa, and, as in Egypt, in connection with woollen underclothing. The climate, however, in South Africa was soon found to differ considerably from that of Egypt, insomuch that it was found to be far too damp to allow of the cotton drill being worn successfully. With the heavy rains our soldiers had so repeatedly to encounter, they became drenched immediately, the effect being that their underclothing speedily shrunk into an unwearable mass. Nothing daunted, and with the sensible desire to make "Tommy" comfortable at the front, our officials soon made inquiries among Yorkshire woollen manufacturers as to their ability to turn out effectively a woollen fabric to imitate the cotton drill, the result being that woollen serges were immediately dyed the khaki colour, and which are serving admirably all purposes. At first, owing to our authorities being confronted with a literal famine for the article, they bought up all the serges they could lay their hands upon that were undyed, and these have had to serve the purpose, after being dyed the desired shade.

The question naturally arises, how is such a demand for the clothing of 100,000 men going to affect the market for raw material? So far as the present goes the extensive orders which our War Department have placed have had very little effect upon the wool market, but they have come at a time which has helped materially to relieve what would otherwise have been a very acute position. What grades of wool are entering into the making of khaki cloths will no doubt be asked by woolgrowers, and as far as we see to-day both merinos and crossbreds are being largely consumed, and especially the latter. The make-up of the fabric consists of worsted merino warp, while the weft is a fairly fine crossbred, but is a woollen yarn, and not a worsted. Practically speaking, the khaki cloths contracted for by the Government are nothing more or less than an average worsted serge dyed the tan shade. Our Government has contracted for its delivery at 3s. 3d. per yard, 55 inches wide. To colonial woolgrowers the demand for this material for "Tommy" is likely to be far reaching. The call for this material is not stopping at Whitehall, but the desire to have a suit or a costume of khaki is widespread, and a big demand for this material for ordinary use has already set in. Both men and women are eagerly looking forward for these fabrics, and a big run is already assured. This means there will be a big consumption of wool in the making of them. A manufacturer who is running day and night for the Government has shown me a range of samples of khaki cloths, and I think I cannot do better than set before your readers his price list. I may say that the fabrics look remarkably smart, and what he showed me are all made from merino wools. His price list is as follows:—

Width. Inches.	Weight. per yd. oz.	Price. per yd. s. d.	Width. Inches.	Weight. per yd. oz.	Price. per yd. s. d.
56	14-15	3 6	56	11	4 6
56	13-14	3 8	56	13-14	4 6
56	12-13	3 9	56	10-11	5 6
58	10	4 0	56	16	5 4
56	14-15	4 0			

I predict that even the Australian public will ere long patronise these fabrics, and the sooner the better for your woolgrowers.

NOTE.—The word "khaki" is said to have originated as follows:—A native contractor in India was instructed to have a certain kind of wool worked up into a new material. The native weaver produced a cloth, the appearance of which enraged the contractor, and he ejaculated some words sounding like khaki, meaning, "What have you been about?" When the cloth was shown to the authorities it was highly approved of; and the word khaki having been repeated to the inspecting officer, he took it to be the name applied to the cloth, and accordingly set it down as khaki cloth in his books.—Ed. *Q.A.J.*

Dairying.

PIGS AND THEIR MANAGEMENT.—No. 7.

CUTTING UP A PIG.

This, to make the best uses of the meat, must be done skilfully. First, the carcass is halved by splitting the backbone. If bacon is to be made, the side is sawn down so as to cut through the rib bones, leaving a long strip from each side, which may afterward be cut into pieces as seems desirable. The shoulders and hams are cut out and trimmed, and the rib pieces are reserved for roasts or to be salted for boiling. The head and feet are well worth saving, being cleaned and boiled and chopped into small pieces, then once more brought to a boiling heat and then poured out into moulds to set into a solid jelly, when it becomes what is commonly known as brawn, one of the most agreeable kinds of food to be eaten cold. If the chickens are cut up and cooked with the meat it is much improved.

The thin meat, shoulders, and hams are improved by smoking. The meat keeps better during the summer, and a moderate smoking with corn cobs or hickory-bark with the small twigs adds much to the flavour of it. For smoking, the salting should be light, and is best done by the simple rubbing of the meat. The meat, being cut into convenient pieces, is laid upon a bench with the skin down, and a mixture of 7 lb. of fine salt, 4 oz. of saltpetre, and 2 lb. of sugar, of the quality known as coffee sugar, is well mixed. Sometimes spice of various kinds is added, and, on the whole, is desirable. To the quantity of salt and sugar mentioned 1 oz. each of ground ginger, allspice, and cinnamon may be added. These quantities are for 100 lb. of meat. The mixture is rubbed on the meat on the flesh side, not all at once, but at intervals of a week, the meat being left to drain during the intervals. To prevent drying of the meat the pieces are piled one upon the other; a weighted piece of board is laid on the top. Three weeks of this curing is sufficient, when the meat is hung in a smokehouse for final curing by the smoke.

The most important part of this process is the coolness of the smoke and the absence of the fire heat on the meat. The smokehouse should be tight; and to keep out flies it should be lined with fine wire gauze. The fire is best made outside the house in a pit, having a stovepipe laid so as to carry the smoke into the house through the floor. The smoke is thus cooled, and gives a much more pleasant flavour to the meat. Half-an-hour's smoking twice a day for four weeks will be sufficient, and this is better than to smoke the meat every day. If the smokehouse is made impregnable to the meat flies and beetles, it will be the best place for keeping the meat until the warm weather is about to arrive in the spring. Then the meat should be wrapped in paper, or tied in the common paper bags and hung in a dry place, or if perfectly dry it may be packed in boxes or barrels in dry bran. If it is stored in a cool, dry place, it will keep in excellent condition without moulding until the next season.

CURING BACON.

A FEW HINTS ON CURING FOR HOME CONSUMPTION.

Another method which can be used in the case of large pigs is as follows:—Having split the carcass as before, take off the ham, and then the leaf-lard, leaving the kidney on the pork. Now saw the ribs down the centre lengthways, and take out the flat ribs in one piece; you can now either take out the length pork in one length—namely, neck, loin, and griskin—or cut off the shoulder with the neck part on it, and what is known to the trade as a middle is then left. The above-mentioned methods of cutting up will probably be sufficient for our purpose.

The sides or middles, whichever way they are cut, are now ready for salting. If the weather is at all suitable, place them in a good draught for a few hours, to harden, before salting. If the weather is warm, and not suitable for keeping, of course, get it cured as early as possible.

The old-fashioned method of curing—namely, putting the meat on a flag, and rubbing with salt until the hands nearly get cured as well—is now extinct where any weight of bacon is cured. The method (and it is a good one) in use at the present time is to put the bacon in pickle for three days before dry-salting.

PREPARING AND USING THE PICKLE.

The ingredients of a good pickle are as follow, and in these proportions:—

Sodium chloride (common salt)	5 lb.
Potassium nitrate (saltpetre)	½ lb.
Water (cold)	2 gallons.

The above will register with a Twaddles' hydrometer about 28, which gives a specific gravity of 1·14 at ordinary temperatures. If you prefer a sugar brine, mix as before, with the addition of ½-lb. of sugar; when the sugar is added the hydrometer will register about 32, which gives a specific gravity of 1·16 as above.

The use of a hydrometer in the mixing of brines is of great service, it being much more reliable than the old-fashioned method of putting a pig's foot in to see if it floats. If you are curing the carcass in sides, put it in pickle for three days, turning each day. Then take them out, and let them drain a little; lay them on the salting flag on a bed of salt. Sprinkle a little saltpetre on the lean parts of the shoulder, then sprinkle salt over the entire side. Let this stay on for about three days, and then lift up the side, and dump it on the flag; afterwards sprinkle salt alone over it, and let it stand from nine to twelve days, according to the size. A 7-score to 9-score pig will take about nine days after coming from pickle; give larger pigs two or three days more, and, after this, take out of the salt, and wash with clean, cold water, common salt being nearly as soluble in cold water as hot, and hang up to dry for use.

When middles are salted, put in pickle for two days, afterwards in salt for six or seven, take out and wash as before.

When hams are cured alone, take out the hip-bone, and put in pickle for a few days; then salt for twenty-one days, and place a little saltpetre in the hole when you take the bone out to strike the thick part. These methods should answer pretty well in home curing.

The following article on bacon-curing is taken from the *Garden and Field*, South Australia, and is from the pen of the Hon. John Lewis, M.L.C., who has had a wide experience in curing bacon and hams:—

CUTTING-UP AND SALTING.

For many years I have cured hams and bacon, and at the request of many farmers I prepare this paper, which will deal with the curing, smoking, and keeping of hams and bacon. Great care should be taken in cutting the hams and hands, as shapely hands always command a much better price than those badly cut. The quantities of the various condiments to the 100 lb. of meat are as follow:—Two oz. saltpetre well powdered, 3 lb. salt, 2 lb. black or dark-brown sugar, 1 lb. allspice, 1 oz. carbonate of soda, mixed together. Rub the meat first with 1 lb. of honey to the 100 lb. Then rub with the mixture, using about two-thirds of the preparation; then place it in a tub or vat with the fleshy side up. The vat or tub should be placed in a cool place, with plenty of fresh air. In twenty-four hours turn and rub again, adding a little more of the unused mixture; after which turn and rub once every forty-eight hours for six times, using some of the mixture for each time. It should be packed closely in the vat, so as to raise the brine as high as possible. Always keep the hams and hands at the bottom of the vat.

After remaining in pickle for twenty-one days, take out and scrub with a scrubbing brush, using hot water. After thoroughly cleaning, soak in cold water for ten hours, then hang up in a dry place (not in a cellar), where there is a good draught. If flies are troublesome, it is advisable to stop up any cracks or crevices with lard, then dust them over with pollard, which will stick to the oily substance and form an artificial skin. After hanging from fourteen to sixteen days it should be ready for the smokehouse.

SMOKING BACON AND HAMS.

The walls of the house should be 12 feet high. The smoke should be conducted to the bacon as cool as possible. My smokehouse is 13 feet high and 10 feet square; I hang the hams and bacons close to the top in rows about 6 inches apart. Stinkwort makes an excellent smoke. I kindle a small fire on the floor of the smokehouse, then place a few handsful of stinkwort (that which has been gathered while the sap was in it, and stowed away till dry) on the fire, and after it is nicely alight put a few handsful of sawdust on the top; then place a sheet of galvanised iron on the top of the fire, which will cause it to smoulder and produce smoke only. About 3 feet above the fire I suspend another piece of galvanised iron, so as to prevent any heat from the fire reaching the bacon. It usually takes about ten days to smoke properly, making a smoke as before mentioned every other day.

AFTER CARE OF THE BACON AND HAMS.

After leaving the smokehouse it is as well to go over the hams and hands with lard and pollard, and stop up any place that is likely to be attacked with flies. It is a good plan to place the hams and hands in calico bags, taking care to tie them tightly at the top. Hang them in a warm place; I hang my bacon in a kitchen. I have strips of 3 x 3 deals fixed to the ceiling with hooks screwed into them, and suspend the bacon there until the weather gets warm. Then I pack it away in bran or sawdust, which must be dry. It should be taken out every six weeks and examined, and if found to be getting mildewed or to be sweating, it should be rubbed dry with a cloth; then add a little chaff to the sawdust or bran. If you use bran, be sure to see that it is free of mite. If possible, keep the hams and bacon in an even temperature. Too much heat will cause the fat to melt and turn rusty, and if too damp it will sweat and decay. By treating and curing your bacon by this process you will have an article that will always command a good price and will keep for many years. The fat remains sweet and the lean soft and savory. This treatment is based upon a pig weighing 200 lb. A smaller one does not require to be kept in pickle or smokehouse so long. A heavier pig will require to be kept longer. The longer you use the brine the better it is. It may require boiling occasionally.

CURING PORK.

Here is a good recipe for curing pork, so that it can be kept in our hot climate. The proportions are to 1,000 lb. pork take 10 quarts fine salt, 3 lb. brown sugar, and a little saltpetre (dissolved). Mix and rub on the meat as soon as cut up. The meat is laid on a board about ten days, then sewn up in a cloth bagging.

The leading essentials in form of a bacon pig are—First, good length and depth of body without excessive width; secondly, limbs strong and of medium size; and, third, head and ears and neck of medium size. That is not a bacon pig which has a very short compact body, a frame broad in proportion to its length, and that stands on small and short legs. It is a lard pig. Nor is that a bacon pig which is razor back and greyhound in its build. It is a scrub that would soon eat its owner poor. The bacon pig is not a hard feeder. It is a pig that will turn its food, not into an unhealthy substance that melts away in cooking, but it will turn it into a good meat.

HOW TO SALT AND SMOKE MEAT

is an article in the American *Acker und Garten Zeitung*. The *modus operandi* therein advised is the following:—

After cutting up the hog, throw the pieces into a cask with cold water for three or four hours, change the water once or twice until it is no more coloured by blood; then hang to dry in a drying-room for five or six hours. Meanwhile, mix well together ten parts of salt, half-part of sugar, half-part of roughly-ground coriander seeds, and one-tenth part of purified pulverised saltpetre. Rub this well into the meat, and prepare a brine in the proportion of 17 quarts of water, 6 quarts of salt, and ¼-pint of the pulverised saltpetre. This brine is boiled for about half-an-hour, while it is constantly stirred to prevent the burning of the saltpetre. Place the meat with the skin downwards until the cask is full, pour the cold brine on to it until filled up to two-thirds of its height, and place a weight of 150 lb. to 200 lb. on the cover to press the meat down into the cask. After two or three days you may observe a yellow scum over the cover, which must be removed. After sixteen to twenty days take the meat out, place it in another cask, this time with the skin upwards, and pour the pickle on it again. Smaller hams, bacon, and tongues do not require to remain more than ten to fourteen days in the pickle. Hams will look a vermilion colour, even the bones, and they are very juicy. The coriander prevents any fermentation. The smoking of hams, &c., deprives them of part of the water; certain constituents of the smoke (empyreumatical oils and creosote) enter and increase the durability, but the smoke must be continuous and dry—not watery. The wood must, therefore, be quite dry, and it is better not to use any from pines or firs, which give a bad taste. The heat of the smoke should not exceed 54 degrees Fahr., or part of the fat will exude and get a yellow colour. Sausages made from liver require from one to two days: other sausages, about eight days; bacon, fourteen days; hams, frequently three to four weeks.

Another shorter way of curing is to rub a mixture of thirty-two parts of salt and one part of saltpetre into the yet warm meat, to sprinkle as much bran over it as will cling, wrap it into a newspaper, and smoke it as before. To keep hams in the warm months it is best to pack them into a box placed in a dry place and containing dry and sifted wood ashes. Butchers frequently use a quick way of smoking. They take fifty parts of raw wood vinegar, 100 parts of water, and two and a-half parts of juniper oil, into which they dip the meat for some seconds and hang it up to dry in a room hot enough to make the fat soft. After the drying they dip again three or four times, and always leave the meat to dry three days. They can also use a paint brush instead of dipping.

THE MOST PROFITABLE PIG.

The pig which is deep in the heart and round in the ribs will of necessity produce a larger quantity of first-class bacon—viz., prime back and ribs—than an animal that is light-chested and flat-sided. This is one of the most valuable parts of the animal, and it is therefore desirable to add as much as possible to its weight. Looking at the matter from a breeder's and pig-feeder's standpoint, the pig that is deep in the heart and round or well sprung in the ribs will certainly be a good feeder, because he has plenty of room for his stomach, liver, heart, and all the main organs. Roundness of rib nearly always indicates a good constitution; flatness of rib the reverse. A pig well sprung in the ribs will carry considerably more meat on the bone, and have the ribs better clothed with flesh, than one of different conformation.

CHARACTER OF PORK.

There is a vast difference in the quality of pork. Some is sweet, tender, and juicy. Some is directly the reverse. Feed is largely responsible for this difference. In experiments, conducted for the purpose of determining the influence of food on the quality of pork, it has been found that milk, barley,

oats, and peas produce the most solid and best flavoured meat. Potatoes produce a soft pork. By-products of the flour mill make an inferior pork. Oil meals produce pork that is oily and of poor flavour. The meat made from feeding beans is without flavour, and hard and indigestible.

THE BACON PIG.

In the course of a consular report to the United States, the Bristol Consul, Mr. Lathrop, after pointing out how the American pig-breeder was missing the British bacon market, says:—

He (the pig-breeder) will have to begin at the beginning—that is to say, he must change the type of pig. He would find the importing of some Tamworths the best way to do this. Some boars of this lean and sweet-fleshed breed would rapidly effect a change in the hogs in a district, and the new type could be fixed by care in feeding, the main thing being not to feed on maize. No maize-fed pig will make bacon satisfactory to the English consumer. Firm flesh and firm fat in limited quantity cannot be obtained from corn. Once the desired type is obtained, the curing is an easy matter. The singed side would probably be found to be the most satisfactory cut for the market. A packer that will take the trouble to thus study the English market, and will patiently and carefully strive to meet its requirements, will find that his brand is speedily established, and that dealers will be eager for his wares at remunerative prices.

FERTILITY OF PIGS.

Under good management a brood sow may multiply herself by sixteen to twenty in one year, and repeat this excellent performance for several years. For one animal to increase from 180 to 200 times in the course of its life is one of the remarkable instances of the profit that may be made from certain branches of agricultural practice, when intelligence and skill are brought to bear on the industry. In each year the produce of the sow may be available for market within the twelve months. The profit of any kind of live stock depends chiefly upon the rapidity with which it is matured and the smallest quantity of feeding for the marketable product made. No other animal grows so rapidly in so short a time as the pig, or makes a more saleable product. Now, in order to make the sow do her part, and give the greatest number of strong, healthy pigs, it will be necessary to husband her strength as much as possible. She should not be bred until she is one year old. Then she should be bred to farrow about April and September. These are the best months in the year for the pigs to come. The April pigs, with proper care and management, can be put on the market in November or December. The September pigs, if properly cared for, will be large enough to stand the cold weather, and will be a nice age for feeding up for the June market.

AN ENORMOUS PIG.

The largest pig that probably was ever reared was recently slaughtered in New York. The animal was a Jersey red boar, two and a-half years old, weighing, when alive, 1,609 lb., and when killed and dressed 1,336 lb.

The *National Provisioner* has the following to say of this prodigy:—"The huge swine measured over 9 feet from tip of its nose to end of its tail. It measured 2½ feet across the loin, 2½ feet across the ham, and 6 feet in girth. This makes the pig 3 feet through. It is split at the shoulder, and to look into the great carcass is like looking into the crevice of a cavern. The carcass spreads across the perspective of the store like a Titanic statue of Pork personified. It also looks like the body of the great hog god embalmed and reposing in its gigantic majesty. From hip-bone to toe it measures 3½ feet, and about the same from the crest of the shoulder-blade to the bottom of the foot. The great fat jowls extend nearly 2 feet across. From between the ears to the tail is over 7 feet. The tail itself is the smallest thing in the big proportions. It is a mere point in the air. The face of the pig is also small for the size of

the animal. It is only 16 inches long. The hams are monstrous in size, and the vast stretch of pork in the long waist is borne just above the ground by four comparatively small feet. The usual porker is a mere pigmy by its side. The biggest pig heretofore grown weighed 1,250 lb. dead weight."

EXPERIMENTS IN PIG-FEEDING.

Some recent experiments (says the *Field*), made to ascertain the quantity of food required to produce 1 lb. of pork with pigs of different ages, shows that pigs from 115 to 155 lb. live weight require 4·67 lb. of food to increase their weight by 1 lb.; pigs from 155 lb. to 195 lb. want 4·99 lb. of food; from 195 lb. to 235 lb., 5·43 lb. food; and from 235 to 275 lb. live weight they require 6·24 lb. of food to make the 1 lb. gain in weight. Thus showing that it is not profitable to feed pigs too long.

DAIRY FARMING IN HOLLAND.

ONE feature of Dutch agriculture in recent years has been the development of stock rearing and dairy farming, accompanied by an extensive cultivation of forage crops. For a number of years the imports of grain of all kinds into the country have exceeded the exports, while, on the other hand, the exports of dairy produce, margarine, and fresh meat, especially mutton, have been steadily growing. The increase in the number of live stock is shown not only by an absolute augmentation in the dimensions of the herds, but also by an increase in the number of animals kept on a given area, owing, to some extent, to greater attention being paid to stall-feeding than formerly, which has been facilitated by the importation of cheap fodder grain.

The importance of the dairy industry in the Netherlands is indicated by the large proportion of milch cows in the cattle herds of the country, and also by the steady growth in the number of butter and cheese factories, co-operative and otherwise. In 1896 there were 639 of these establishments in operation, and in the following twelve months 128 new factories were opened, so that in 1897 there were 702 butter and 65 cheese factories. The estimated gross production of butter and cheese in 1897 amounted to 104,281,846 lb. and 142,113,882 lb. respectively. Of the former, 39,140,700 lb. and of the cheese 38,248,100 lb. were produced in factories, and the remainder was made in farm dairies.

In connection with these remarks on the progress of dairying in Holland, reference may be made to some interesting observations on certain features of Dutch farming contained in a report, recently issued by the Essex Technical Instruction Committee, on the results of a visit of a number of Essex agriculturists to the Netherlands. The districts visited were for the most part polder land—*i.e.*, land which had been reclaimed from the sea or marsh, protected by massive sea walls, and kept drained by pumping engines. The soil was either alluvial or peaty, of great depth, and in many cases kept moist, even in time of drought, by maintaining the water in the canals at a constant level. On the farms in these districts all the cattle were found to be of the pure Dutch breed, which, though in some respects inferior for beef production, is celebrated for the high milk yields furnished by the cows. With the object of improving the herds, the steer calves are usually fattened, while the heifers are reared and only killed if they turn out inferior milkers. The cows are kept in a condition of scrupulous cleanliness, and many of the herds are subjected to a periodical inspection for tuberculosis, which, it is stated, enables the meat, milk, and live stock from such herds to command a ready sale. At a farm at Waddingsteen, which was visited, the average daily yield per cow in January was 14¾ pints, and

in June 28 pints. The average annual yield of milk per cow in this herd during the last six years is 80 gallons; the best cow in the herd gave 1,179 gallons in 1897, and 1,217 gallons in 1898. Premiums are offered by the Government in each district for the best bull, a condition of the award being that the animal shall be available at the request of any person living in the district, the customary charge for service being one florin (1s. 8d.)

The dairy farms of North Holland are stated to be particularly interesting as examples of small holdings. The farms vary in size between 40 and 60 acres. It is reckoned that each cow requires 2 acres of grass land: one acre for summer feed, and one acre for hay. The milk from the farms can be disposed of in three ways: It can either be sold in the neighbouring town; or it can be made into cheese, in which case about half the cream will be converted into butter, and the whey from the cheese used for feeding pigs; or, lastly, it can be sent to a condensed milk factory. The price paid for the new milk at the factory is stated to be just over 3½d. per imperial gallon in summer, and 5d. in winter. In many cases the farms are owned by the occupier, but where rented the rent varies between £3 and £4 per acre, the landlord paying all the outgoings. In the case of a farm of 60 acres at Hoogkarspel, the rent was £3 5s. per acre. The stock on this farm consisted of 20 cows, 3 calves, 3 heifers, 80 sheep, 4 horses, and 20 pigs, the purchased feeding stuffs used on this holding being 3 tons of oil cake per annum. The labour was provided by the occupier, one indoor farm servant, and a labourer, with one or two extra hands for the hay harvest. The wages of the indoor servant were £10 per annum, while the labourer got 11s. 6d. per week, with breakfast and lunch.

The butter-making industry, as has been already observed, is largely in the hands of co-operative associations, those in the north being generally on a large scale, whilst in the south there are many small co-operative dairies, which are, however, gradually being transformed into cream stations, so as to allow of the concentration of butter-making in larger factories. Co-operative cheese factories are a new development in the Edam cheese-making district of North Holland, where most of the farmers still make their own cheese.

A somewhat novel and interesting form of co-operation, mentioned as existing in South Holland, is the co-operative mart which has been established by an association of market gardeners and fruitgrowers, known as the Westland Society. By an arrangement with the society the innkeeper of each of the seven villages in the district has provided an auction room for the daily sale of market garden produce, and all the produce which is not sold privately is brought daily to the auction-room, and sold to buyers who attend the sales from Rotterdam, the Hague, and other large towns. That these marts have proved of great benefit is stated to be shown by the rapid extension of the gardens and the increase in glasshouses since the society came into existence and the marts were opened.

Wages in the purely agricultural districts visited were under, rather than over, those paid in Essex, and the hours of labour longer; but there was, it is stated, an appearance of contentment among the people, and no signs of pauperism were to be seen. The lowest customary wage was 1s. 8d. a day of ten to twelve hours, which is stated to be from 30 to 40 per cent. below the rates current in Essex; but on one of the farms visited the labourers got a cottage rent free, and in North Holland certain meals are provided. It must also be mentioned that the women work in the fields along with the men, so that the earnings of a family may be considerable. The labouring classes lead frugal lives, and in the poorer districts rye bread is the staple food and tea the favourite beverage. It was found that the labour bill on many farms reached the high figure of £2 10s. per acre per annum, and it is evident that, though individual wages may be low, the total amount expended on labour is high.—*Journal of Agriculture* (London).

THE DAIRY HERD.

QUEENSLAND AGRICULTURAL COLLEGE.

RETURNS FROM 1ST TO 30TH APRIL, 1900.

Name of Cow.	Breed.	Date of Calving.	Yield.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.			
Linnet* ...	Ayrshire	19 June, 1899	138	4·1	6·33	
Leesome* ...	,, ...	12 Oct. ,,	488	3·9	21·31	
Ream Routhie	,, ...	19 Sept. ,,	355	3·8	15·1	
Laverock* ...	,, ...	7 Dec. ,,	678	3·8	28·85	
Blink* ...	,, ...	21 Mar., 1900	982	3·9	42·89	
Rosebud* ...	,, ...	10 April ,,	583·5	3·7	24·17	
Lavina* ...	,, ...	6 April ,,	735	3·7	30·45	
Bonny ...	,, ...	17 April ,,	160	3·6	6·45	With first calf.
Effie* ...	Jersey	16 Dec., 1899	482	4·6	24·83	
Connie ...	,, ...	29 Sept. ,,	329	5·6	20·63	
Content ...	,, ...	11 July ,,	361	5·	20·21	
Eileen* ...	,, ...	13 Aug. ,,	384	5·5	23·65	
Stumpy ...	,, ...	1 July ,,	341	4·9	18·71	
Ivy ...	,, ...	2 Oct. ,,	358	4·7	18·84	
Opale ...	,, ...	16 Dec. ,,	474	4·5	23·88	
Beatrice ...	,, ...	19 Oct. ,,	353	4·6	18·18	
Bashful ...	,, ...	16 Nov. ,,	331	4·0	14·82	
Pet ...	Grade Jersey ...	6 Oct. ,,	98	3·9	4·28	
Scarlet ...	South Coast ...	13 Oct. ,,	515	3·8	21·91	
Toughy ...	,, ...	11 Sept. ,,	358	3·6	14·43	
Plum ...	,, ...	3 Dec. ,,	421	3·6	16·97	
Fancy* ...	,, ...	21 Mar., 1900	927	3·7	38·41	
Banjo ...	Devon	5 Oct., 1899	82	4·8	4·4	
Broad ...	,, ...	5 Oct. ,,	116	4·5	5·84	
Rosie ...	,, ...	11 Oct. ,,	112	4·1	5·14	
Patience ...	,, ...	5 Oct. ,,	104	4·4	5·12	
Monday ...	,, ...	24 Oct. ,,	121	4·0	5·42	
Spot ...	Shorthorn ...	17 Oct. ,,	431	3·9	18·82	
Painter ...	,, ...	4 Sept. ,,	445	3·7	18·44	
Brush ...	,, ...	12 Sept. ,,	394	3·9	17·20	
Blossom ...	,, ...	14 Sept. ,,	424	3·5	16·62	
Florrie ...	,, ...	15 Sept. ,,	473	3·6	19·07	
Kit ...	,, ...	16 Sept. ,,	484	3·8	20·59	
Hilda ...	,, ...	25 Mar., 1900	751	3·6	30·28	
Folly ...	,, ...	12 Mar. ,,	562	3·5	22·03	
Louisa ...	,, ...	6 April ,,	420	3·7	17·4	
Polly ...	,, ...	29 Jan. ,,	745	3·6	30·03	
Cherry ...	,, ...	19 Feb. ,,	778	3·6	31·36	
Nestor ...	,, ...	21 April ,,	95	3·8	4·04	
Frizzy ...	,, ...	27 Sept., 1899	453	3·9	19·78	
Kate ...	,, ...	13 Aug. ,,	387	3·9	16·90	
Violet ...	,, ...	1 Oct. ,,	493	3·8	20·98	
Laurel ...	Grade Shorthorn	4 Oct. ,,	583	3·7	24·15	
Restless ...	,, ,, ...	4 Oct. ,,	610	3·9	26·64	
Rosella ...	,, ,, ...	9 Oct. ,,	633	3·6	25·5	
Redmond ...	,, ,, ...	6 Oct. ,,	444	3·7	18·4	
Shelly ...	,, ,, ...	13 Oct. ,,	341	4·0	15·27	
Peggy ...	,, ,, ...	14 Oct. ,,	314	3·8	13·3	
Stranger ...	,, ,, ...	15 Aug. ,,	347	3·7	14·3	
Empress ...	,, ,, ...	23 Aug. ,,	458	3·9	20·	
Mundah ...	,, ,, ...	29 Sept. ,,	491	3·0	21·4	
Sally ...	,, ,, ...	23 Sept. ,,	489	4·1	22·4	
Whiteflank...	,, ,, ...	4 June ,,	488	3·9	21·31	
Star ...	,, ,, ...	17 Dec., 1898	412	4·8	22·1	
Ginger ...	,, ,, ...	17 June, 1899	495	4·0	22·1	
Biddy ...	,, ,, ...	18 May ,,	511	4·4	25·1	
Bally ...	,, ,, ...	12 Oct. ,,	302	3·5	11·83	
Beauty ...	,, ,, ...	14 Oct. ,,	522	3·4	19·8	
Leopard ...	,, ,, ...	17 Oct. ,,	388	3·8	16·6	
Trial ...	,, ,, ...	26 Oct. ,,	574	3·9	25·	
Duchess ...	,, ,, ...	27 Oct. ,,	535	3·8	22·76	
Podge ...	,, ,, ...	1 Nov. ,,	552	3·8	23·48	
Russet ...	,, ,, ...	10 Nov. ,,	475	3·9	20·7	
Rusty* ...	,, ,, ...	17 Jan., 1900	735·5	3·7	30·47	
Alice ...	,, ,, ...	13 Nov., 1899	638	3·8	27·14	
Daisy ...	,, ,, ...	21 Nov. ,,	583	3·6	23·4	

THE DAIRY HERD—*continued.*

RETURNS FROM 1ST TO 30TH APRIL, 1900—*continued.*

Name of Cow.	Breed.	Date of Calving.	Yield.	Per cent' Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.			
Nell ...	Grade Shorthorn	1 Dec., 1899	446	3·5	17·4	
Gertie* ...	,, ,, ...	31 Mar., 1900	682·5	3·8	29·04	
Lady ...	,, ,, ...	31 Mar. ,,	460	3·6	18·43	
Damsel ...	Holstein ...	5 Dec., 1899	521	3·2	18·6	
Dairymaid*	,, ...	15 Mar., 1900	971	3·2	34·79	

The dairy herd, with the exception of the cows marked thus,* and which are being fed for experimental purposes, were grazed on natural pasturage only.

MOULD IN BUTTER CASKS.

THE *Agricultural Gazette*, Tasmania, draws attention to the action taken by the Finnish Department of Agriculture in consequence of complaints of the presence of mould in butter-casks. An investigation was recently undertaken by the Department on the origin of such mould. It has been generally supposed that it was due to the use of inferior materials for the casks, too thin parchment paper, and a too prolonged steeping in water of the casks prior to the butter being put in them. But the results of the inquiry indicate that neither of these practices nor the fact of a cask remaining too long on one bottom have anything to do with the formation of mould. They may perhaps to some extent advance the moulding, but it seems certain that the mould itself is due to infection.

Mould germs may, of course, locate themselves on the outside as well as the inside of the cask, both on and between the staves, and it seems probable that mould infection of the cask may as often occur at the place of production itself as in cellars and warehouses. Mould germs may, no doubt, also be found in the parchment paper. Indeed, the experiments have proved that the cask and the paper themselves are capable of sustaining such mould developments as long as there is sufficient moisture. The growth, is, however, slow, especially with scant access of air; but with more liberal access of air, with higher temperature, and if the butter is allowed to moisten casks and paper the formation of mould goes on at a rapid rate. The more salt the liquid contains the slower the growth of mould, and when the percentage of salt is sufficiently high the mould germs do not grow at all. It was found by experiment that even in the most carefully cleaned and steamed casks, when the paper had been sterilised, mould would appear, and this must no doubt have originated from mould germs in the air. It was ascertained that careless packing greatly assisted the development of the mould germs.

So far as protective measures are concerned, the following are some of the precautions recommended:—The mould or mould germs should be removed or destroyed by scouring, brushing, or rinsing the casks in water to which soda or salt has been added, or by steaming the casks with hot steam for five or ten minutes. The parchment paper should be soaked in a strong solution of salt or steamed, and tight casks used, into which the butter should be packed as carefully and firmly as possible, avoiding empty spaces. The casks should be lined in the warm season with thick parchment paper, or by using two layers of thinner paper, and the inside of the cask should be sprinkled with salt immediately before placing the butter in it; the salt should previously have been placed on a hot stove for half-an-hour, and should be kept in closed stone or glass jars.

QUEENSLAND AGRICULTURAL COLLEGE.

EXPERIMENTAL PIG-FEEDING.

By JOHN MAHON, Principal.

With a view of comparing the feeding value of barley in a cooked and raw condition, the experiment, of which particulars are supplied herewith, was conducted.

Eight pigs, about five months old, were selected, and were all raised under similar conditions.

They were divided into two lots of four each. The pigs were from common-bred sows by a Berkshire boar. They were fed for a period of four weeks on ground barley and boiled barley.

Table I. gives the weight of individual pigs at the beginning of the experiment, and the gain made during the period.

It is learned from Table II. that the pigs fed on cooked barley gained 18 lb. more than those fed on ground barley.

Table III. shows the amount of food consumed during the period.

The pigs were fed three times a day, and were given as much as they would consume, and also received a liberal supply of drinking water. By looking at the summary of results, we find that Pen A, fed on boiled barley, required 5·43 lb. of food for 1 lb. of gain; and Lot B, fed on ground barley, required 5·94 lb. of food for every 1 lb. of increase. While admitting the fact that cooked barley gave better results, it must not be overlooked that the advantage is slight. It is advisable that further experiments be conducted before coming to any conclusion on the matter. A perusal of the tables will give a good idea of the relative values of cooked and ground barley as resulting from the experiment.

TABLE I.

Showing Weight of Pigs at Beginning of Experiment and Daily Increase of each Pig, and Total Increase of Each.

Pen A.	Fed on Boiled Barley.				Totals.	Pen B.	Fed on Ground Barley.				Totals.
	1.	2.	3.	4.			1.	2.	3.	4.	
	lb.	lb.	lb.	lb.	lb.		lb.	lb.	lb.	lb.	lb.
Weight at beginning of experiment	92	92	93·5	90	367·5	Weight at beginning of experiment	105	97	96·5	91	392·5
Gain—						Gain—					
9 March	3	3·5	2	3	11·5	9 March	3	3·5	4·5	4	15
10 „	·5	·5	2·5	1	4·5	10 „	2	2	3	2	9
11 „	·5	...	1	1	2·5	11 „	1·5	·5	1	1	4
12 „	...	1	1	3	5	12 „	2·5	1·5	2	1·5	7·5
13 „	2	4	3	4	13	13 „	2	1	1·5	2	6·5
14 „	2	1	2	1	6	14 „	2	1	...	1	4
15 „	1	·5	2	1	4·5	15 „	1	2	1·5	1·5	6
16 „	2	·5	2	1	5·5	16 „	2	1·5	1	1	5·5
17 „	1	2	1	1·5	5·5	17 „	1	1·5	2·5	2	7
18 „	2	3	1·5	1·5	8	18 „	1·5	2	2·5	1	7
19 „	3	2	3·5	3	11·5	19 „	1	1	·5	2	4·5
20 „	2	2·5	1	1	6·5	20 „	1·5	...	2	2	5·5
21 „	2	1	...	2	5	21 „	2	1	1·5	1	5·5
22 „	1·5	1	1·5	1	5	22 „	2·5	1.5	1·5	2·5	8
23 „	1	4	·5	1·5	7	23 „	2	1·5	3	1	7·5
24 „	2·5	2	3	·5	8	24 „	2·5	1	·5	2	6
25 „	...	1	2	5	8	25 „	1	1	2·5	·5	5
26 „	4	1	2	...	7	26 „	1·5	..	2	1	4·5
27 „	1	1	3	3	8	27 „	2·5	·5	2	1·5	6·5
28 „	2	2	2	1·5	7·5	28 „	2	2	3	...	7
29 „	1	3	1	2	7	29 „	4	1·5	2	3	10·5
30 „	4	1	4	3	12	30 „	3	1·5	2	2	8·5
31 „	3	3	2·5	3·5	12	31 „	2	3	1·5	1·5	8
1 April	3	3	2	·5	8·5	1 April	2	3	3	2	10
2 „	·5	2·5	2	4·5	9·5	2 „	3	1	2	·5	6·5
3 „	2·5	1·5	3	1·5	8·5	3 „	2	2	3	2·5	9·5
4 „	2	3·5	2·5	2	10	4 „	3	1	1	·5	5·5
5 „	2	1·5	2·5	·5	6·5	5 „	1·5	·5	1	2·5	5·5
Gain per head ...	51	52·5	56	54	213·5	Gain per head ...	57·5	39·5	53·5	48	195·5

TABLE II.

SHOWING WEIGHT OF EACH PIG AT BEGINNING OF EXPERIMENT, WEEKLY GAIN, AND TOTAL GAIN DURING PERIOD.

PEN A.	Fed on Boiled Barley. 1.	2.	3.	4.	Totals.	PEN B.	Fed on Ground Barley. 1.	2.	3.	4.	Totals.
	lb.	lb.	lb.	lb.	lb.		lb.	lb.	lb.	lb.	lb.
Weight at beginning of experiment	92	92	93·5	90	367·5	Weight at beginning of experiment	105	97	96·5	91	392·5
Gain—						Gain—					
1st week	9	10·5	13·5	14	47	1st week	14	11·5	13·5	13	52
2nd week... ...	13·5	12	10·5	11	47	2nd week... ...	11·5	8·5	11·5	11·5	43
3rd week	11·5	14	13·5	13·5	52·5	3rd week	15·5	7·5	15	9	47
4th week... ...	17	16	18·5	15·5	67	4th week	16·5	12	13·5	11·5	53·5
Weight at end of experiment	143	141·5	119·5	144	581	Weight at end of experiment	162·5	133·5	150	139	583
Gain at end of experiment	51	52·5	56	54	213·5	Gain at end of experiment	57·5	39·5	53·5	45	195·5
Daily gain by each pig	1·82	1·87	2	1·93	...	Daily gain by each pig	2·05	1·41	1·91	1·6	...
Average daily gain per pig	...	...	...	...	1·93	Average daily gain per pig	...	...	...	...	1·74

TABLE III.

SHOWING AMOUNT FOOD CONSUMED WEEKLY BY EACH PEN, TOTAL FOOD CONSUMED DURING PERIOD OF EXPERIMENT, AVERAGE DAILY CONSUMPTION PER PIG.

PEN A.	Barley (boiled).	PEN B.	Barley (ground).
	lb.		lb.
1st week	280	1st week	280
2nd week	284	2nd week	286
3rd week	292	3rd week	290
4th week	304	4th week	307
	1,160		1,163
Average daily consumption by each	10·3	Average daily consumption by each	10·38

SUMMARY.

PEN A. Average Daily Consumption per Pig.	Total Food Consumed.	Average Daily Gain per Pig.	Number lbs. Food Consumed for 1lb. increase.	PEN B. Average Daily Consumption per Pig.	Total Food Consumed.	Average Daily Gain per Pig.	Number lbs. Food Consumed for 1lb. increase.
10·3	1,160	1·93	5·43	10·38	1,163	1·74	5·94

FEEDING FOR MILK.

DAILY YIELD OF COWS FED ON NATURAL PASTURE ONLY FOR A PERIOD OF SIXTEEN DAYS.

Name of Cow.	1. Milk.	1. Test.	1. Butter.	2. Milk.	2. Test.	2. Butter.	3. Milk.	3. Test.	3. Butter.	4. Milk.	4. Test.	4. Butter.	5. Milk.	5. Test.	5. Butter.
	lb.		lb.	lb.		lb.	lb		lb.	lb.		lb.	lb.		lb.
Eileen (Jersey) ...	17	5·0	·95	14	5·1	·79	16	5·0	·89	15	5·5	·924	15	5·1	·85
Ellie (Jersey) ...	18	4·8	·967	18	4·4	·88	17	4·3	·818	17	4·5	·85	19	4·4	·93
Laverock (Ayrshire)	22	3·9	·94	23	3·6	·92	23	3·9	·9	22	3·7	·91	22·5	3·6	·9
Leesome (Ayrshire)	21	3·9	·91	22·5	4·0	1·0	23	3·8	·97	24	3·8	1·02	22	4·0	·98
Curly (Grade) ...	22	3·8	·93	23	3·6	·92	21	3·5	·82	21·5	3·7	·89	22	3·6	·88
Rusty (Grade) ...	28	3·9	1·2	26	3·4	·99	26·5	3·7	1·09	23·5	3·9	1·02	24	3·4	·91

FEEDING FOR MILK—*continued.*

Name of Cow.	6.			7.			8.			9.			10.		
	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.
	lb.		lb.	lb.		lb.	lb.		lb.	lb.		lb.	lb.		lb.
Eileen	15	5·3	·889	15	5·5	·924	14	5·0	·78	15	5·4	·9	16	5·1	·91
Effie	18	4·6	·92	17	4·2	·79	17	4·4	·83	18	4·1	·82	18	4·6	·92
Laverock	22	3·9	·96	23	3·7	·95	23	3·6	·92	23·5	3·5	·92	22·5	3·9	·93
Leesome	22	3·9	·96	18	4·2	·84	18·5	4·1	·84	18·5	3·8	·78	17	3·9	·74
Curly	23·5	3·8	1·0	22	3·5	·86	20	3·9	·87	19	3·7	·78	21	3·5	·82
Rusty	23	3·6	·92	23	3·5	·9	22	3·9	·96	21	3·9	·91	22	4·0	·89

Name of Cow.	11.			12.			13.			14.			15.			16.		
	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.
	lb.		lb.	lb.		lb.	lb.		lb.	lb.		lb.	lb.		lb.	lb.		lb.
Eileen	17	5·3	1·0	14	5·0	·78	15	5·6	·94	14	5·6	·87	15	5·0	·84	15	5·1	·85
Effie	17	4·3	·81	18	4·5	·9	17	4·5	·85	17	5·0	·85	18	4·3	·86	16	4·4	·83
Laverock	21	3·5	·82	23·5	3·8	·99	22	3·9	·96	24	3·6	·96	24	3·5	·9	25	3·9	1·09
Leesome	17	4·3	·82	18	4·0	·8	16	3·9	·69	17	3·8	·72	18	3·7	·74	18	4·0	·80
Curly	23	3·9	·89	24	3·8	1·02	22	3·6	·88	19	3·9	·82	19	3·5	·74	20	3·6	·8
Rusty	22·5	3·4	·85	22·5	3·8	·95	21·5	3·5	·84	23	3·4	·81	24	3·5	·91	22·5	3·6	·9

DAILY YIELD OF COWS RECEIVING IN ADDITION TO NATURAL PASTURE A DAILY RATION OF 20 LB. OF CHAFFED GREEN MAIZE FOR A PERIOD OF SIXTEEN DAYS.

Name of Cow.	1.			2.			3.			4.			5.		
	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.
	lb.		lb.	lb.		lb.	lb.		lb.	lb.		lb.	lb.		lb.
Eileen (Jersey) ...	17	5·2	·99	17	5·0	·95	15	5·4	·9	16	5·4	·96	15	5·3	·89
Effie (Jersey) ...	19	4·5	·95	21	4·4	1·02	18	4·3	·86	19	4·4	·93	18	4·5	·90
Laverock (Ayrshire)	28	3·8	1·19	22	3·9	·96	25	3·6	1·0	26	3·8	1·1	22	3·8	·93
Leesome (Ayrshire)	24	4·4	1·17	22	4·1	1·01	20	4·1	·91	24	3·9	1·04	22	3·8	·93
Curly (Grade) ...	24	3·6	·96	25	3·8	1·06	25	3·4	·95	25	3·3	·92	27	3·3	·99
Rusty (Grade) ...	30	3·6	1·22	27	3·9	1·17	27	3·7	1·15	28	3·8	1·18	28	3·6	1·12

Name of Cow.	6.			7.			8.			9.			10.		
	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.
	lb.		lb.	lb.		lb.	lb.		lb.	lb.		lb.	lb.		lb.
Eileen	16	5·2	·94	15	5·1	·85	16	5·5	·93	15	5·3	·89	14	5·2	·81
Effie	19	4·3	·91	17	4·4	·83	19	4·6	·97	18	4·2	·86	23	4·3	1·00
Laverock	26	3·5	1·01	23	3·6	·92	21	3·8	·89	22	3·8	·93	22	3·6	·88
Leesome	23	4·0	1·02	20	4·1	·91	20	3·9	·87	18	4·4	·88	14	4·0	·62
Curly	26	3·5	1·01	25	3·6	1·0	24	3·3	·88	22	3·7	·91	23	3·5	·9
Rusty	28	3·9	1·22	26	3·5	1·01	26	3·6	1·04	25	3·6	1·0	26	3·7	1·07

Name of Cow.	11.			12.			13.			14.			15.			16.		
	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk	Test.	Butter.
	lb.		lb.	lb.		lb.	lb.		lb.	lb.		lb.	lb.		lb.	lb.		lb.
Eileen	15	5·2	·87	15	5·5	·92	16	5·3	·94	14	5·1	·79	14	5·4	·84	12	5·4	·72
Effie	17	4·4	·83	17	4·7	·89	15	4·9	·78	16	4·5	·80	16	4·6	·82	16	5·0	·82
Laverock	22	3·8	·93	25	3·7	1·03	21	3·7	·87	22	3·9	·96	22	3·9	·96	18	4·1	·82
Leesome	20	4·4	·98	20	4·1	·91	18	4·2	·84	17	4·0	·76	15	4·4	·73	11	4·3	·52
Curly	21	3·5	·82	22	3·8	·93	23	3·6	·92	21	3·6	·84	23	3·9	·90	21	3·6	·84
Rusty	24	3·8	1·01	24	3·4	·9	25	3·9	1·09	23	3·6	·92	24	3·8	1·02	23	3·5	·9

Total Amounts of Milk and Butter Obtained during each Period of Sixteen Days.

Name of Cow.	Fed on Natural Pasture Only.		Name of Cow.	Fed on Natural Pastures, and with the addition of a daily ration of 20 lb. Chaffed Green Maize.	
	Milk.	Butter.		Milk.	Butter.
	lb.	lb.		lb.	lb.
Eileen	242	14·07	Eileen	242	14·24
Effie	280	13·91	Effie	288	14·24
Laverock	365	15·02	Laverock	367	15·38
Leesome	310·5	13·61	Leesome	308	14·10
Curly	342	13·92	Curly	377	14·83
Rusty	375	15·08	Rusty	414	17·02
	1,914·5	85·61		1,996	89·81

With a view of ascertaining if the milk flow of cows grazed on good natural pastures could be increased, and if so, to what extent, by the additional food, six cows were selected and allowed the run of a well-grassed paddock for a period of sixteen days. A daily record was kept of their yield. For sixteen days subsequent to this period they were allowed the same pasturage, receiving in addition a daily ration of 20 lb. of chaffed green maize daily. In making the selection heavy milkers were avoided, the preference being given to cows having a tendency to decrease the yield. From a perusal of the table of yields it will be seen that the increase that resulted from the additional ration daily was small, being 81·5 lb of milk or 4·2 lb. of butter from the six cows for the period of sixteen days. The smallness of the increase is no doubt due to the good condition of the pastures at the time.

TUBERCULOSIS.

The tuberculosis question seems to have entered upon a new stage in the United States, and in some respects we think a retrograde one. The New York State Legislative Committee have had the whole question under consideration lately, and they have made a report recommending that the inspection of cattle shall be taken out of the hands of the State Board of Health and placed under the control of the Commissioner of Agriculture. So far so good; but the next proposal comes as a surprise, and is somewhat mixed. The State is to select a farmer familiar with the values of stock as appraiser, and the officials shall condemn cattle by physical examination only. It is thus a proposal to dethrone tuberculin and put physical examination first, such examinations, of course, to be made by veterinary surgeons. This decision has been arrived at after a most exhaustive inquiry into the facts connected with the use of tuberculin, as the results following its use have not, as yet, been sufficiently uniform to be depended on for universal application. This decision puts back the hands of the clock some years, and we feel sorry, as, though the results have not been so uniform as desirable, we are fain to believe the veterinary surgeons were going on right lines, and, given time, would arrive at certainty and uniformity.—*Scottish Farmer.*

The Horse.

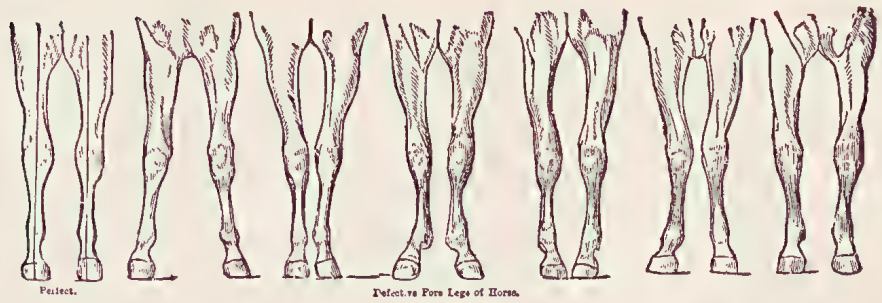
DEFECTS AND BLEMISHES IN THE LEGS OF THE HORSE.

By P. MEGNIN, in the *Live Stock Journal.*

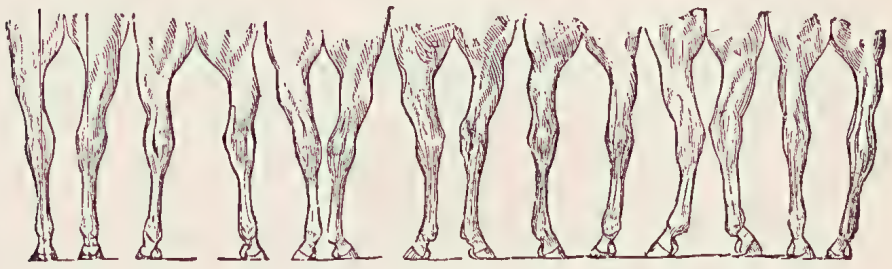
THE position and condition of the limbs of a horse when standing is called its perpendicularity. The perpendicularity is right when the weight of the body is distributed evenly over the limbs, and the perpendicularity of each limb is good. Perpendicularity is verified by means of certain lines. Thus, with regard to the front limb, considered by itself, a vertical line dropped from the point of the shoulder to the ground ought to touch the latter a little in front of the toe of the hoof (Fig. 45). If this line fall upon the toe the horse is said to be "under himself in front" (Fig. 46); if the line fall behind, the horse is said to "cover plenty of ground." It will not be necessary to enter into long explanations as to why these two last positions constitute defective perpendicularity. The fact is that the limb, when thus formed, gets tired sooner than it would if it were vertical; its equilibrium is less assured, and the horse is in danger of falling. The direction of the limb may be faulty in its different parts with regard to each other. In Fig. 45 there is a representation of perfect perpendicularity in the foreleg, the axis of the radius or arm forming a straight line with the cannon bone. This line may be broken in two ways, either very much forward, then the knee is carried to the front (Fig. 48), and the limb is distinguished by a defect of perpendicularity called bent knee; bent when the defect has been brought on by continued fatigue or exhaustion, or when the animal was born with the defect. Many horses are born so, and when this occurs in a horse its safety is generally as great as if the limb were quite straight. A limb which is bent by over-work, on the other hand, has no solidity in the front, and is liable to frequent falls. When the line is broken, so that the horse stands back at the knee, the limb is said to have the knee effaced (Fig. 49). The defect is less serious than the former one. There is no danger of falling, but there is danger of fatigue of the tendon, which may cause halting. The lower extremity of the limb may have a more or less good direction. The normal direction is shown in Fig. 50, in which the axis of the phalanges, taken altogether, make an angle of 45 degrees with the ground. If this axis approaches the perpendicular the horse is straight on his fetlock joint (Fig. 51).

If, on the contrary, it approaches the horizontal, the horse dips at the fetlock (Fig. 52). The first of the blemishes is a sign of exhaustion, the second of weakness. In the hind limb, considered apart from its fellow, and examined in profile, the rule is that a vertical line, drawn from the point of the buttock, ought to touch the hock point and go along the hinder part of the back tendons before touching the ground (Fig. 53a). Every horse which has the limb in front of this line is said to be under himself behind (Fig. 53c). Every horse which has the limb behind the vertical line is said to be encamp behind (Fig. 53b). These two defects of perpendicularity are of the same importance as are those of the same name in the foreleg. When the hind limb has a regular perpendicularity the axis of the leg forms with that of the horizon an angle of rather more than 45 degrees. If the angle is more than this—that is to say, if the axis of the leg approaches the vertical excessively, as in Fig. 54—the horse is said to be straight on its hocks. When, on the contrary, the angle formed by the hock approaches in shape that of a right angle, the horse is said to have a bent hock (Fig. 55). The first of these two conformations is frequently met

Plate CXCVI.



Perfect. Defective Fore Legs of Horse.



Perfect. Defective Hind Legs of Horse.

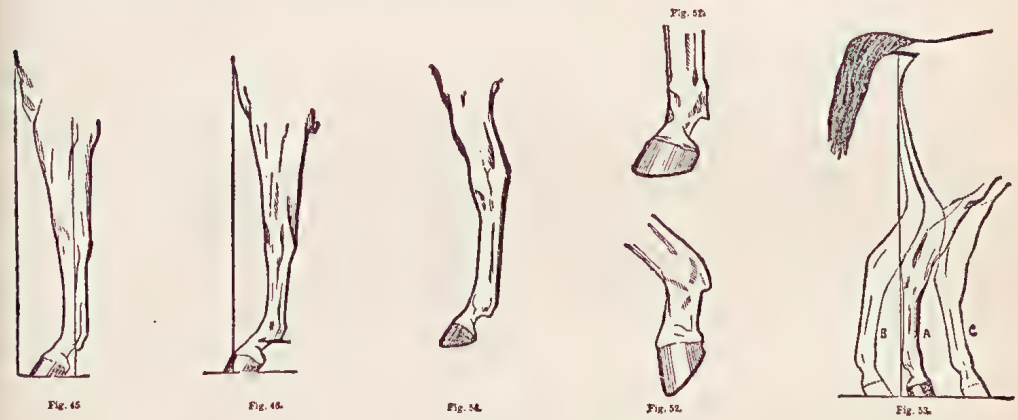


Fig. 45. Fig. 48. Fig. 54. Fig. 52. Fig. 53.

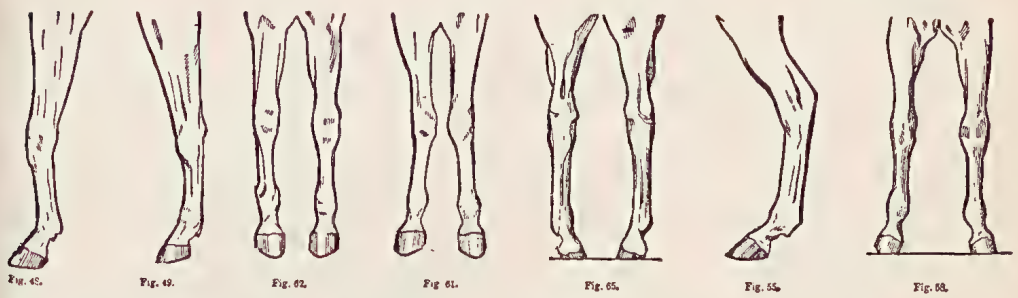


Fig. 47. Fig. 49. Fig. 62. Fig. 61. Fig. 65. Fig. 55. Fig. 63.

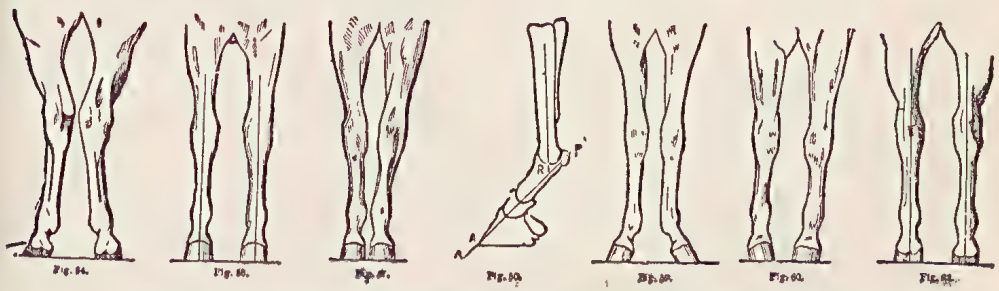


Fig. 64. Fig. 66. Fig. 67. Fig. 59. Fig. 60. Fig. 62. Fig. 64.

DEFECTS AND BLEMISHES IN THE LEGS OF HORSES.

with in high-bred horses, and causes no other inconvenience than that of making the animal rather stiff in its movements. The ligaments of a bent hock, like those of a long-jointed horse, are liable to sprain.

We have thus enumerated the good and bad points of perpendicularity which can be noted in a horse that is examined in profile. We will now pass on to those which may be discovered by standing straight opposite a horse, either before or behind it. If the front view of the horse be taken, and the fore limbs looked at as a whole, the fact of their proper perpendicularity is evident when a vertical line drawn from the upper part of each limb divides them into two equal parts (Fig. 56). When the limbs fall within these two vertical and parallel lines, the horse is said to be too close in front (Fig. 57). When, on the contrary, the two limbs fall outside these two lines, the horse is said to be open at the front. Moreover, when the feet are too wide apart the horse is said to walk wide (Fig. 58). If the two feet, instead of being parallel to each other, have their toes turned outward, the horse is said to be crooked-legged (Fig. 59). If, on the contrary, the toes converge inwardly, the horse is said to be splay-footed (Fig. 60). Very often in a crooked-legged horse the knees are closer to each other than are the feet, and awkward protuberances are formed on the inside. Knees of this kind are called ox-knees (Fig. 61). A splay-footed horse has usually the contrary defect; its knees are too wide apart; it is then said to be splay-footed and bandy-legged (Fig. 62). The proper perpindicularity of the hinder limbs of a horse may be ascertained by dropping a vertical line from the upper part of each hock. If this divides the limbs into equal halves, the shape is as it should be (Fig. 63). A horse is said to be crooked-legged behind when the points of the toes diverge; that is to say, when they are too wide apart, and turn outwards. In a horse with this defect the hocks also incline inwards, and it is said to be cow-hocked (Fig. 64). A horse is splay-footed behind when the ends of the toes converge towards the same point Its appearance is quite different to that of a crooked-legged horse, for the hocks are too wide apart, and the horse is, consequently, not only splay-footed, but too open behind (Fig. 65). Crooked-legged and splay-footed horses are, whether the defects occur at the front or at the back, in danger of cutting themselves, or of chafing one leg against another, these expressions being synonymous terms, which may be adopted by those who want to say that a horse "brushes" and wounds the fetlock of one foot with the shoe of the opposite one. The danger of wounds of this kind constitutes the principal inconvenience of these defects, though they are exceedingly ugly. We will here close our list of defects and blemishes of perpendicularity. A knowledge of them can only be obtained by a frequent practice of the directions here given, and their importance will be specially appreciated when horses have to be examined for purchase.

GOVERNMENT STUDS.

THE following is from a recent issue of the English *Live Stock Journal*:—It is interesting to note the enormous grants made by foreign Governments to their horse-breeding establishments. France maintains her breeding studs at an annual cost of about £270,000. Austria devotes to the maintenance of her studs, the purchase of promising young stock, and allied expenses, about £140,000. The Hungarian Government votes £116,500 a year for horse-breeding, but spends in addition large sums in buying horses. Germany works on more economical lines; she votes an annual purchase fund of £45,000, and runs her breeding establishments on business lines, whereby they cost her only about £3,400 a year. Yet Austria, Hungary, Germany, and France are still able to find better breeding stock in England than they can at home.

HORSE-BREEDING FOR MILITARY REMOUNTS.

THE enormous losses in horses during the present war in South Africa, and the great demand on all sides for horses for the mounted troops and for purposes of transport in Africa and India, give interest to the following letter from Major-General E. T. H. Hutton, C.B., formerly Commandant of the New South Wales Land Forces, and now holding a command in South Africa. The major-general, in response to a request from the New South Wales Department of Agriculture, wrote in 1894 to the Minister of Mines and Agriculture on the subject. We reprint the letter from the *Agricultural Gazette of New South Wales;* and also, from the same source, an article by Mr. J. L. Thompson, at that time Principal of the Hawkesbury Agricultural College, on "Horses for the Indian and European Markets":—

HORSE-BREEDING FOR MILITARY REMOUNTS.

From Major-General E. T. H. Hutton, C.B., A.D.C. to the Queen, Commanding Military Forces, *to* The Minister of Mines and Agriculture.

New South Wales Military Forces,
Headquarters, Sydney, 4th September, 1894.

SIR,—In reply to a verbal request of Mr. Campbell, Department of Agriculture, I have pleasure in forwarding to you an extract of a paper read by me on the 28th ultimo, in which I have alluded to the horse supply of Australia. My motive for doing this is to invite the attention of the Government to the fact that in the opinion of many leading authorities in the colony, and of myself, sufficient attention is not being paid to the breeding of the horses for domestic purposes, and that the quality of such horses is, in consequence, gradually deteriorating.

There can be no question but that a very important industry in this colony, and in the other colonies of Australia, is seriously threatened, and an export trade in horses, which should be the *specialité* of Australia, is likely to become less and less as years go on.

The Indian Government are now beginning to breed large numbers of horses for the use of the Indian army; and the Indian horse trade for military purposes may, in consequence, be expected to decrease every year. It will be necessary, therefore, to create a market for Australian horses elsewhere, and I have endeavoured, in the remarks made on the 28th, to show that a great and increasing trade in horses for military purposes at the present moment presents itself in Europe, which, if Australian horse-breeders will only consider and develop the class of horses existent in Australia, should become not only a source of wealth to Australia, but should also directly benefit this continent, by encouraging a pastoral industry of great value.

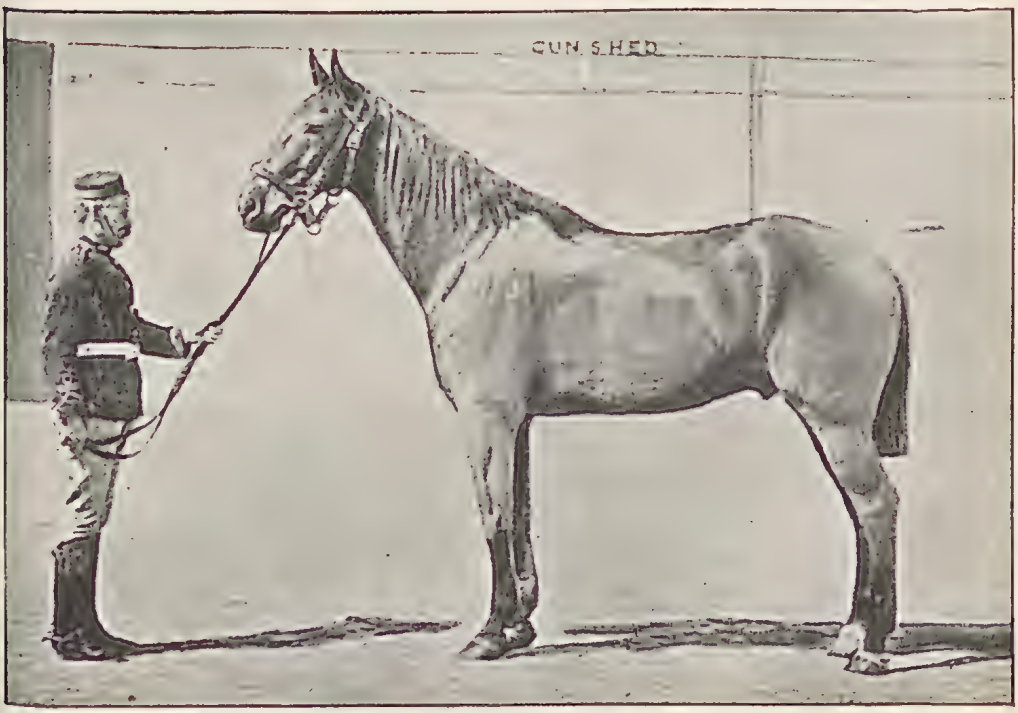
The climate, soil, capital available, and the excellent thoroughbred stock existing in Australia, alike contribute towards making Australia generally a horse-producing country.

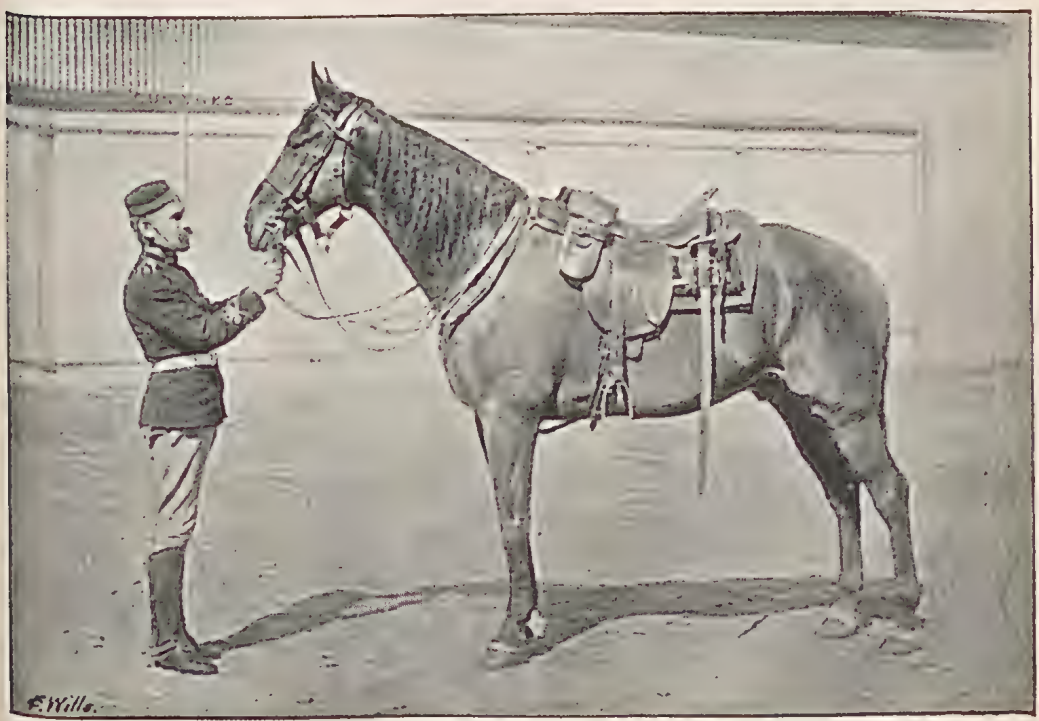
The facilities of shipment to Europe yearly become greater and simpler, so that horse-producers in Australia should be able to command the European horse market over the heads of South America, North America, Syria, and North Africa. The horses of the two former countries have not the blood nor the fine qualities of the Australian horse at his best, while the horses of the two latter are small and too slow for military or even for general use for domestic purposes.

I beg to say that I have photographs made of the four types of horses to which I have alluded, which may serve to illustrate my points.

I venture to think that some initial steps should be taken by the New South Wales Government in concurrence with the other Australian Governments—Firstly, in putting a tax on "stallions," so as to restrict the

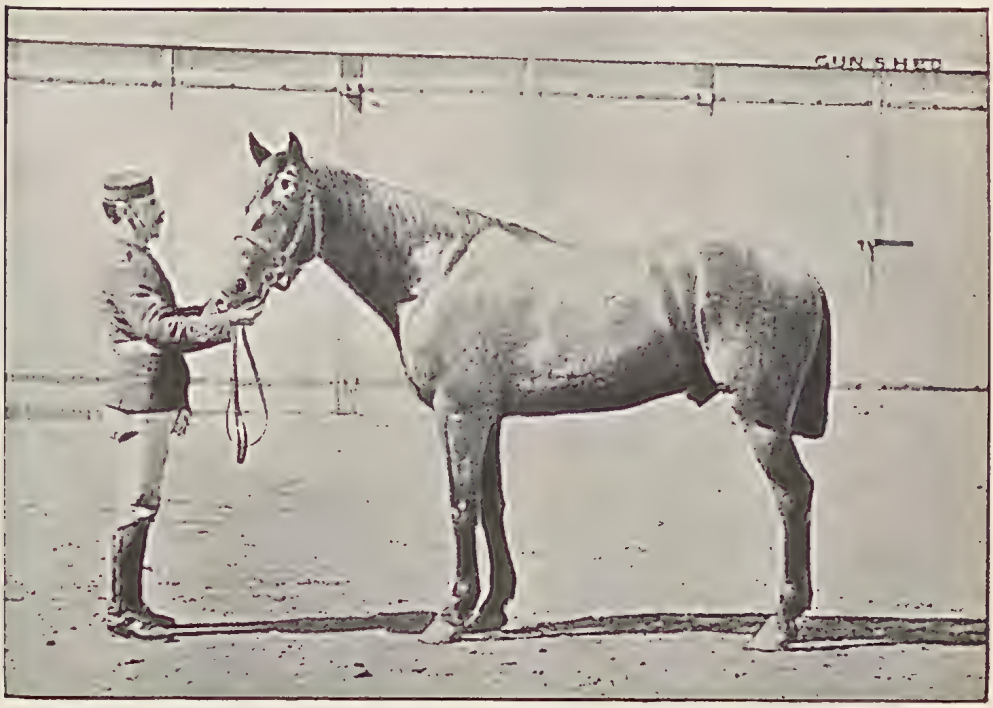
Plate CXCVII.

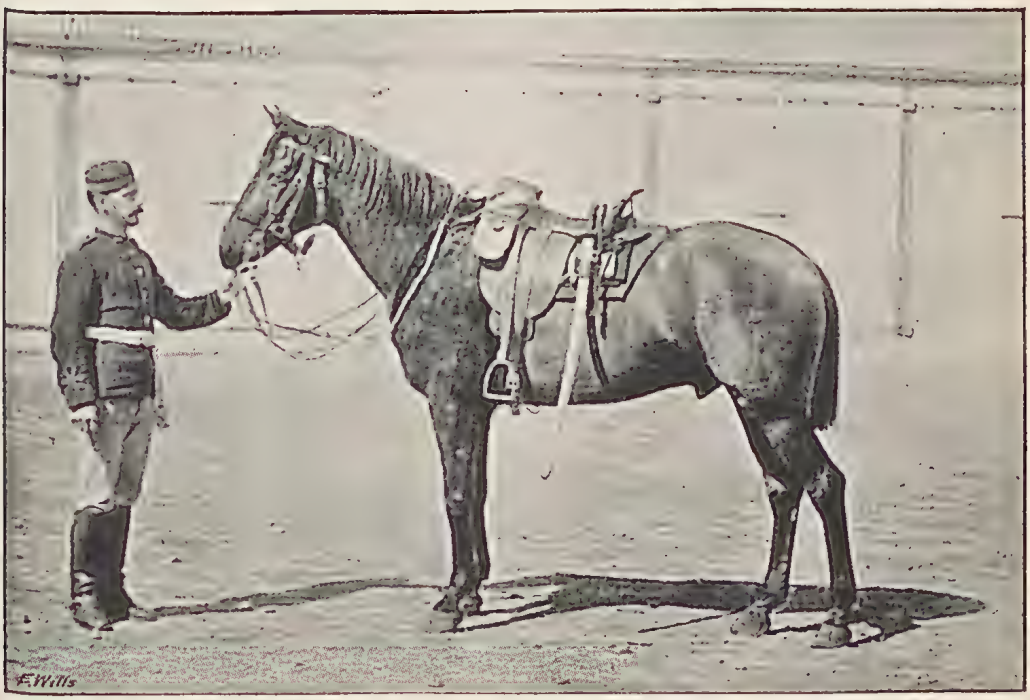




HEAVY CAVALRY.

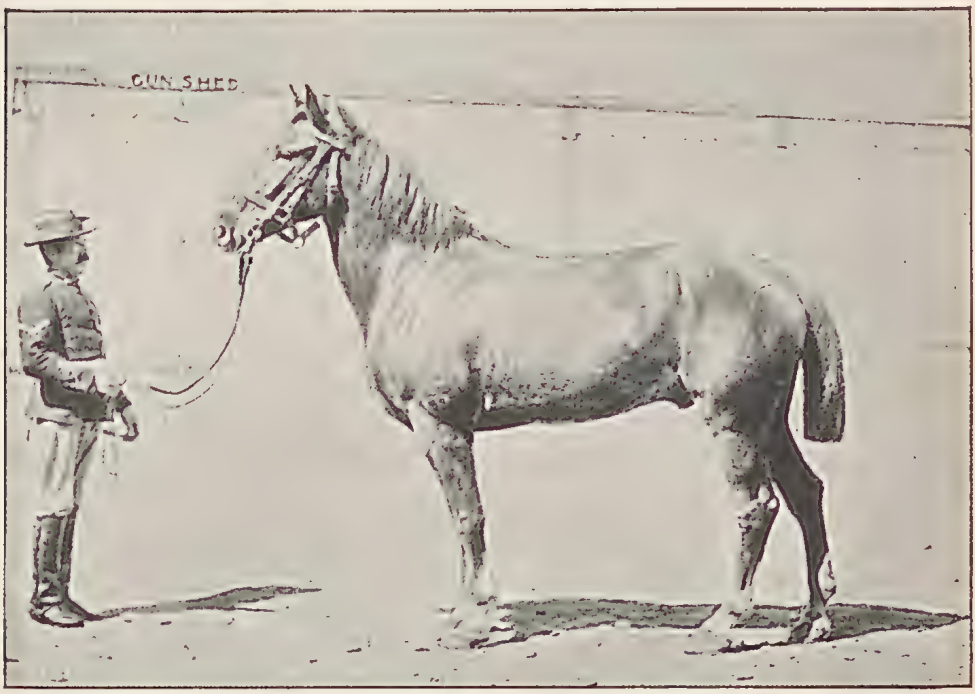
Plate CXCVIII.

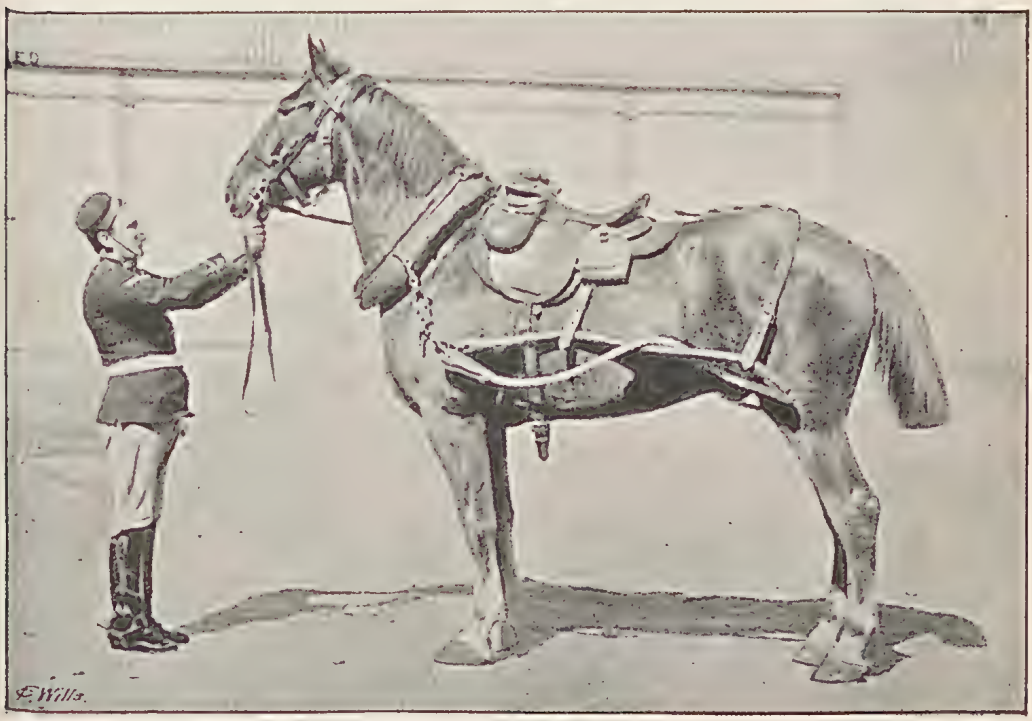




LIGHT CAVALRY.

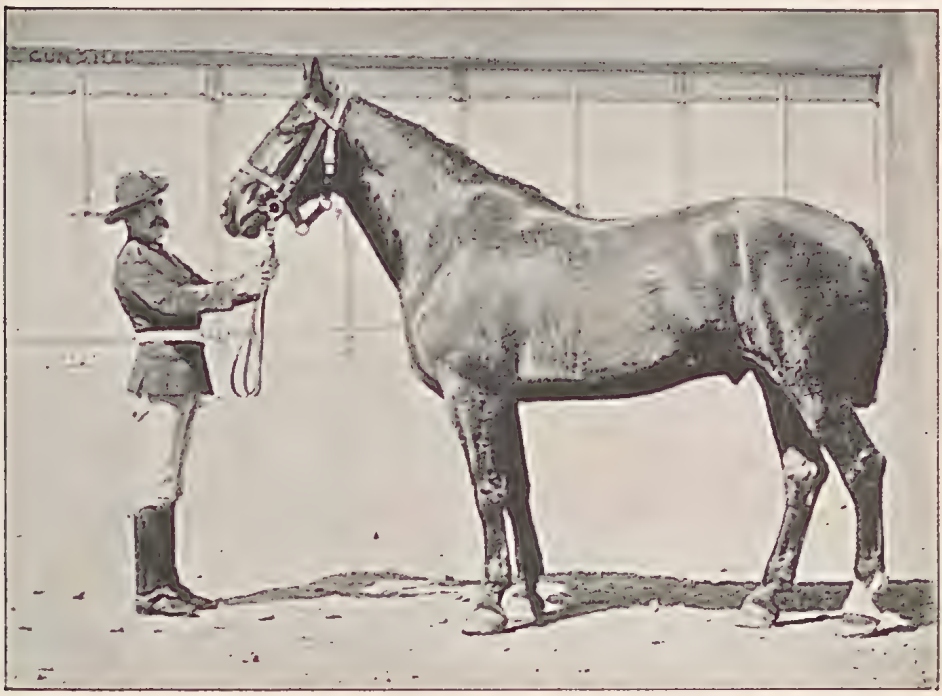
Plate CXCIX.

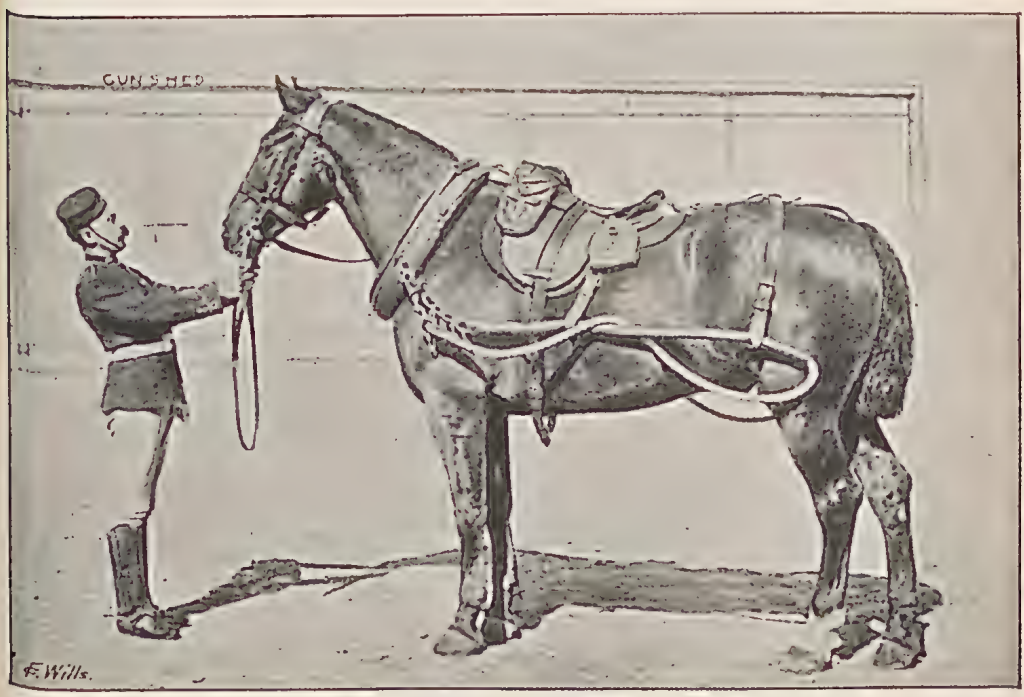




ARTILLERY HORSE.

Plate CC.





TRANSPORT.

breeding from weakly, useless sires; and, secondly, that the Indian Government and the Imperial Government should be approached with the view to a remount purchasing agency being established in this colony, presided over by a carefully selected Imperial officer of experience.

Such an agency would at once create a market for the very horses which I have described, and establish the requisite standard which Australian breeders should endeavour to reach in order to command the military horse market of Europe. This system would speedily develop the European horse trade throughout Australia, the importance of which I have in my remarks on the 28th endeavoured to emphasise.

I have, &c.,

EDWD. T. H. HUTTON, Major-General and A.D.C.,
Commanding Forces, New South Wales.

Extract from Lecture by Major-General Hutton, delivered at the Rooms of the Royal Society, Sydney, under the auspices of the United Service Institution of New South Wales, on Tuesday, 28th August, 1894.

Let me close my remarks by reminding you that the mobility of mounted troops for strategical purposes must be necessarily in direct ratio—namely, to the quality of their horses. It is a fact, I fear, only too patent to any careful observer, that the Australian horse is gradually deteriorating in bone, sinew, and, therefore, in staying power—in all those qualities which go to make a horse valuable for military purposes, and, I might add, for domestic purposes also. It is a subject which should engross the earnest attention of everyone interested in the future of the colony—namely, to consider what means should be taken to arrest the tendency to breed light, narrow, thoroughbred horses capable of nothing more useful than to win a six-furlong race. A future generation will, I fear, have serious occasion to rue the slight heed paid to the development of a breed of horses which shall be valuable for its general qualities of utility.

It is, further, a matter which deserves earnest thought as to whether the capabilities of soil, of climate, and economic facilities possessed by Australia to breed horses have not been overlooked, and whether a great trade in horses, especially for military purposes, might not be developed in Europe, with the most important results to the whole of Australia, and to New South Wales in particular.

There are four descriptions of horses required for military purposes, namely:—

1. The heavy cavalry horse, of bone, quality, and power, 16 hands.
2. The light cavalry horse, of good body and good quality, 15·2 hands.
3. The artillery horse, of power and activity, 15·2 to 16 hands.
4. The transport horse, of bone and power, 15·2 hands.

The medium class, or light cavalry horse, may be estimated as representing to a European military power £75 as a five-year-old, or at the commencement of its military life. It may be calculated that 30,797 horses of all kinds are yearly required by the armies of Great Britain, France, Germany, and Austria, namely:—France, 14,100; Germany, 9,370; Austria, 5,840; Great Britain (exclusive of India), 1,470. This enormous number is with extreme difficulty supplied in times of peace—with the strain of war the demand for horses would be prodigious.

The importance of developing a trade in horses now in times of peace, with the prospect of increased demand in time of war, I leave to some abler pen than mine to show. I have only endeavoured to indicate the possibilities of a source of wealth which my experience in remount questions in other parts of the world have put me in a position to realise.

HORSES FOR INDIAN AND EUROPEAN MARKETS.

By J. L. THOMPSON,
Late Principal, Hawkesbury Agricultural College, Richmond.

In these days of depression and low prices for almost every product, the capabilities of our soil and climate for producing a horse suitable for the Indian and European trade commends itself to all who have the interests of this great continent of Australia at heart.

Australia is already famed for its wool, beef, mutton, dairy, wine, and other products; and the conditions of its food and climate are more favourable to the production of a serviceable horse, particularly for the great continent of Europe and India, than perhaps are those of any country in the world. Here, as a rule, we have no severe winters, and horses can be produced on the natural pastures with little or no artificial feeding. Australia is pre-eminently a most desirable place for cavalry horse-breeding, as is manifest from the fact that the Government of India require a large annual supply of horses of a sort which it has been well ascertained can neither be bred in India nor purchased at any place nearer to it than Australia. The breeding of heavy draughts of the Clydesdale, Shire, Suffolk Punch, and other kindred classes is not by any means remunerative at the present time, and the high prices of twenty years ago which then obtained for this class of horse have gone, I fear never to return; whereas a first-class light-legged horse, with breeding and quality, always commands a high price, either for saddle or carriage purposes.

The iron horse and swift steamers on our rivers and seas in the intercolonial trade have to a great extent superseded the services of the draught horse.

Horse-breeding for the turf is a very precarious undertaking, and only those of independent means can continue to prosecute this business.

I have in my mind the case of a noted studowner in this colony who sold a yearling filly for £1,400 in 1892, while in 1893 some twenty head of yearlings of the same breeding only realised about the price of the one filly of the previous year.

The breeding of suitable horses for the Indian and European trade can be undertaken by the occupiers of small and medium-sized farms, and I know of no investment that would pay better, or be more easily and pleasantly undertaken. Moreover, the mares required to produce suitable horses for export, when mated to the proper sire, could perform the whole of the work of a mixed farm, and at the same time rear a valuable foal each year. It is well known that a mare can be worked with care almost up to the day she foals, and be all the better for it.

Another advantage the small holder would have is that the youngster, being accustomed to the stable, harness, drays, &c., while suckling its dam, would be much more docile than the animal reared on a large run.

As the Indian remount service prefer their horses unbroken, very little handling would be necessary, as the youngster thus bred could be taught to lead with a few lessons. It could also be shipped with greater safety, and would, I am sure, have a better chance of standing the sea voyage and arriving at its destination in good condition without knocking itself about. A little chaff and corn could also be given to the young stock during the winter months or periods of drought, and at the present prices for farm produce I do not consider the feed could be put to better account. Another advantage the small holder would have would be that he could obtain a better selection of sires, and could mate his mares with those which would be most likely to produce the most suitable animal. It would certainly be a very valuable adjunct to the farmer if only, say, five or six head, worth £30 each at five years old, could be added to his income. Taking into consideration the low price of wool, cattle, and produce generally, I know nothing that would pay better at the present time.

Colonel Williams, of the Indian remount service, paid a visit to these colonies some few years ago in order to ascertain how far the breeders here could supply the demand for the Indian service; and after visiting several of the studs in Australia he expressed himself as simply astounded at the capabilities of the herbage, climate, and economic conditions for producing the class of horse wanted in India. It is now generally admitted by Anglo-Indians and dwellers in the Mauritius that the soundest and most durable horses for a hot climate are those bred in Australia. The class of horse in greatest demand in India for remounts, Colonel Williams says, is a stout animal, between 15·2 and 16 hands high, with as much breeding as possible. The British soldier and his accoutrements weigh from 16 to 18 stone, and a weak and weedy animal is simply useless. For a suitable horse the Government are prepared to pay £46 for a five-year-old learned to lead only. It costs £11 sterling per head to land a horse in Calcutta, thus leaving £35 sterling for the breeder. This animal would represent the medium cavalry horse mentioned by Major-General Hutton as being worth, to a European military power, £75 sterling as a five-year-old or at the commencement of its military life. Now, the question may be fairly asked, with the material at present in these colonies, how are the four descriptions of horses required for military purposes, as mentioned by the major-general, to be produced? After consultation with some of the most experienced horse-breeders in this colony, I am of opinion that the first and second descriptions might be produced from the same source, as they will, no doubt, vary in size and quality:—

1. The heavy cavalry horse, of bone, quality, and power, standing 16 hands high.
2. The light cavalry horse, of good body and good quality, standing 15·2.

I think it will be recognised that there are fewer of the above classes of horses in Australia at the present time than there were twenty years ago. It is unfortunately too true, as the major-general says, that, owing to insufficient attention being paid to the breeding of horses for domestic purposes, they are generally deteriorating. It cannot, therefore, be expected that large numbers of suitable horses can be produced for some time to come; still, the sooner breeders commence operations on the proper lines the better it will be for all concerned.

Now, as to the production of the above:—1st, the heavy cavalry horse, of bone, quality, and power, and the light cavalry horse, of good body and quality, standing from 15·2 to 16 hands in height, as already mentioned, in my opinion, can be produced from one common source, as they will, of course, vary in size and quality as already indicated.

THE SELECTION OF THE DAM.

There is at the present time in this colony, in my opinion, a large number of clean-legged, medium-sized, handsome mares with good bone and heads, good action and tempers, and standing from 15 to 15·2 hands high. They should have as much breeding as possible, good constitutions, and capacity for work. Greys must be discarded, as they are not in favour for army purposes. No doubt most of the above would prove, on inquiry, to be the product of a thoroughbred stallion from a clean-legged draught mare.

THE SELECTION OF THE SIRE.

It is well known that the Arab sire has given the best results in India, but they cannot be obtained here in sufficient numbers. The English thoroughbred has not been successful in India in getting the class of stock required, as many of the produce are spindle-shanked and light-barrelled. The Norfolk trotter, Yorkshire roadster or hackney (synonymous terms), in my opinion, mated with mares as described above, will get the stamp of horse required. Some,

no doubt on the true principle of breeding, will object to this horse as a sire, being generally supposed to be a halfbreed; but these horses have become, from steadily pursued breeding for many generations, a distinct class and stamp, and can, as a rule, be depended upon in getting stock after their own characteristics.

Even in India it is authoritatively stated that these horses get better limbed and generally more powerful stock than any of the other breeds, and are now being largely used by the Indian Government. A leading authority in England says of the hackney stallion: "He stands on stout, short legs, with excellent feet and joints, and is sounder perhaps than any other breed in England." After all, the best English thoroughbred blood predominates in the veins of the modern hackney. The hackneys are coming to the front, and they will stay there.

Mares of the description given, put to such horses as Mr. Philip Charley's, of Belmont Park (Lord Derby, junr.), cannot fail to produce stock suitable for cavalry horses for India or any European nation. Of course, it will never be expected that every animal so bred will be fit for cavalry purposes, but the great majority I feel assured will.

I am strongly of opinion that to produce artillery and transport horses, of bone, power and activity, the Cleveland or Yorkshire coach-horse must play an important part. I have had considerable experience with halfbred Clevelands for active farm work in Victoria, and I have never seen horses that could do more work with so much ease, and upon so small a quantity of food. They may truly be termed "a general purpose horse," being all that could be desired for active farm work in the field, active and powerful on the road, or, if need be, the saddle. They are also good-tempered, docile, with good constitutions.

If selected, active, powerful, staunch, sound, medium-sized draught mares are put to a first-class Cleveland bay or Yorkshire stallion, a great majority of the progeny will be fit for artillery or transport purposes, as some will be necessarily bigger than others.

HORSE-BREEDING IN INDIA.

I have before me notes by the late Mr. E. M. Curr, Chief Inspector of Stock, Victoria, on a report by J. H. B. Hallen, general superintendent of horse-breeding operations in India, dated Meerut, 9th March, 1886, from which I transcribe the following pertinent remarks:—"The Government of India have given up horse-breeding entirely, after over eighty years' unsuccessful trial, but they continue to import stallions, whose services it supplies gratis to the best mares of country breeders. Some 300 stallions are kept by the Government for this purpose. It is shown by the report that India is highly unsuited to the breeding of horses by the following recorded facts:—

1. That it is found necessary to allow an imported stallion a considerable period in which to become acclimatised before he is put to the stud.
2. That the average number of foals got by a stallion in India amounts only to something over twelve, instead of to sixty or one hundred, as in Australia and other countries.
3. That the produce of imported stallions display, when compared with their sires, a great falling off in bone below the knee, and general want of substance.
4. That mares imported into India are constantly twelve or eighteen months before they are capable of breeding.
5. Again, the cost is very great. Colonel Robbins, who some years ago was purchasing horses in these colonies for the Indian cavalry, stated that no stud-bred horse in India was ever delivered fit for use under £100."

The first thing noticeable, then, in horses of both sexes introduced in India, is that there ensues at once an attack on and permanent reduction of the sexual or procreative powers. A fact so well known and important should require no comment. It accounts for all that follows in India. What, then, is the cause of the results? What is it that has wrecked in India the attempt so long and urgently made to breed troop horses of substance, stamina, and good legs?

There can be no doubt that it is the unsuitability of the climate which affects, not only horses alone, but extends also to the human race, dogs, and other animals in India. That horses in India have been somewhat improved by selection and the use of picked sires must be granted, but the proceeding is a costly one, and the climate is always undoing what man has temporarily improved. In the words of Mr. Curr, the production of good horses in India is an impossibility—as well try to grow grapes in Greenland. In support of this statement it must be remembered that the most vigorously constituted and longest lived saddle horses are found in dry climates, as the Arab, the Barb, and the Persian; and that the horses of moist climates, especially if hot, are ever of poor quality. Taking these facts into consideration, it will be admitted that the Australian breeder of horses may safely conclude that the production of horses for army purposes in India must eventually fall to him; and it is certainly good news to the Australian horse-breeder to hear, from so high an authority as Major-General Hutton, that nearly all the European military powers are in want of cavalry, artillery, and transport horses. These, to the number of 30,797 head per annum, at the handsome figure mentioned by the major-general, of £75 sterling per head, amount to the enormous sum of £2,309,775 sterling.

Surely this is the best news that the Australian farmer has heard for some time. Considering the great importance of the subject, not only to the occupier of the lands of this colony but to the entire community, I would strongly commend to the notice of the Hon. the Minister for Mines and Agriculture the desirableness of calling together the leading horse-breeders in this colony in conference to discuss this important subject. I am satisfied that this course would be productive of great good. The director of army remounts for India, in the report submitted by him after his return to India from Australia, mentions that in certain districts in Australia thoroughbred stock with large bone, and promising in every respect as sires for Indian horse-breeding, were obtainable. In reply to circulars sent to the leading breeders in this colony by the Indian Government, the following is the reply from W. J. Dangar, Esq., Neotsfield, Singleton:—"I shall have much pleasure in doing what I can for you in informing the breeders of your requirements. I must, however, say, at the outset, that there are very few breeders who breed the description of horse you require, and who would care to export them for the money—viz., 2,500 rupees each. We are in quest of the same kind of horse ourselves The stallions mostly used are those that have been on the turf. The good ones fit to breed from are worth £500 to £1,000, and those which might be got at your figure would not be the sort you require, nor indeed would it be judicious to breed from them, being mostly light in the leg without substance. Your best place to get horses at all would be to get them here. No one would send horses to Calcutta to be approved of on inspection by yourself or deputy, especially, as I said before, as they can get more here for such stallions as you describe, and which are very hard to obtain."

With a view to ascertaining the extent of the trade carried on between India and Australia in horses, I placed myself in communication with the Chief Inspectors of Stock of the four principal colonies—New South Wales, Victoria, South Australia, and Queensland—with the following results, for which I tender my sincere thanks for their prompt and courteous replies.

TOTAL NUMBERS AND VALUES OF HORSES EXPORTED TO INDIA DURING THE SEVERAL YEARS INDICATED.

NEW SOUTH WALES.

			£
1889	...	190 horses, value ...	1,900
1890	...	861 ,, ,, ...	11,581
1891	...	440 ,, ,, ...	8,800
1892	...	865 ,, ,, ...	19,490
1893	...	213 ,, ,, ...	5,320

VICTORIA.

1889 to 1893	16,800 horses, value ...	402,500

SOUTH AUSTRALIA.

1889 ...	Nil	Nil
1890 to 1893	966 horses, value ...	19,320

QUEENSLAND.

1889 ...	Nil	Nil
1890 ...	257 horses, value ...	2,570
1891 ...	Nil	Nil
1892 ...	240 horses, value ...	1,542
1893 ...	961 horses, value ...	9,380

It will be thus seen that during the past five years no less than 21,793 horses have been exported from the above Australian ports, representing a total money value of £482,403 sterling, or an average of a fraction over £22 2s. 8d. per head.

As the majority of these horses have been purchased by dealers from as low a price as £7 per head, and a decent horse fit for the Indian remount service is worth, in Calcutta, not less than from £46 to £53, it will be easily seen that the middleman secures the lion's share of the profit to the detriment of the breeder.

This calls for some reform in the manner of disposing of horses for India, and until this has been accomplished the Australian breeder will not reap the full benefit of this highly remunerative enterprise.

The extortionate charge of the middlemen is a serious drawback to the advancement of the producer at the present time all over the world.

The middlemen have been termed a "numerous and formidable class of social parasites," and are graphically described in a little volume entitled "Colonial Couplets," published by Simpson and Williams, Christchurch, New Zealand, from which I extract the following:—

There's a man who plays a paying game,
Whatever he may say,
Whose name is a great and mighty name
Over the world to-day;
Who stands at ease where others fall—
Where others sink, can swim;
While those who toil and spin—yes, all—
Work, sweat, live, die for him:
He's an absolute ruler, deny it who can,
Our modern monarch, King Middleman.

* * * *

There's a trick to swell each big account,
And every little bill,
Each item in the grand amount
Insensibly to fill;
For they charge to buy and then to sell;
They charge for charging, too,
And then charge you for me as well,
Then me for charging you.
'Tis a marvellous science, deny it who can,
The double game of the Middleman.

ENDURANCE OF THE AUSTRALIAN HORSE.

Of the endurance, staying power, or what is termed "bottom," of the Australian horse, many instances can be given. In 1873 I rode with a weight of 13 stone, a halfbred Cleveland 95 miles in one day, between the hours of 6 o'clock a.m. and 10 o'clock p.m., with only two breaks of three-quarters of an hour each. Mr. Galvayne, the Australian horse-trainer, mentions having ridden a mare 168 miles in two days; and a Mr. Archie Ferguson, of Wallon, on the Dawson River, Queensland, rode a little horse named Billy Button 70 miles between midnight and daylight of the following morning; a Mr. T. S. Collins, of Eton Vale, Queensland, rode a horse named Bonnie Doon 104 miles between the hours of 8 a.m. and sundown; a Mr. P. Bolger, on a horse named Boomerang, near Rockhampton, rode 105 miles between sunrise and sunset; a doctor at Mudgee drove a pair of ponies 120 miles, to see a patient, within one day; a Mr. Evans, who rides 17 stone, rode in one day from a station near Hillston to Hay, a distance of 111 miles; a Mr. Henry, who resides near Swanhill, has a station 110 miles distant, and he frequently drives this distance with halfbred Clevelands of his own breeding on the one day, returning the next—making a journey of 222 miles in two consecutive days. None of the horses above referred to suffered in the slightest degree from the effects of these long and tedious journeys. When one considers the rough treatment that horses receive, travelling day after day a long overland journey from dawn to dark, many nights with no greater refreshment than a whack on the rump with the bridle as they are turned out to grass on land many times as bare as your hand, it is simply marvellous the endurance of many of the Australian horses.

TAX ON STALLIONS.

I quite concur with the remarks of the major-general that it would be in the interests of all concerned if a tax were imposed on all stallions in this colony. This, however, would have to receive the support and concurrence of each of the other colonies to render it effective—it would require to be, in effect, a federal law.

The colony of Queensland has taken the initiative with regard to this matter, and the Press of that colony is teeming with letters on the subject, dealing with its *pros* and *cons*. Some of the writers aver that the imposition of this tax interferes with the liberty of the subject, while others—notably Mr. A. T. Ball, of Varoville, Mackay—take quite an opposite view of the matter.

A tax of, say, £20 per head on stallions would restrict the breeding from weakly, useless sires; and the owners of first-class stallions would be only too pleased to pay the tax, as it would relieve them from having to enter into competition with the owners of inferior animals.

This question was mooted in South Australia some years ago, and I am satisfied that it only requires concentrated action on the part of the colonies to bring this tax into law. It would, however, I feel satisfied, be useless for either of the colonies to introduce such a tax without the support of the others in their, too, adopting a similar measure.

RULE TO FIND WEIGHT OF CATTLE, Etc.

Take measurement of the girth where it is the smallest, round the body, close behind the shoulder; take the length from the front of the shoulder to the insertion of the tail. Multiply the square of the girth in feet and inches with the length in feet and inches, and the product by ·24, ·26, ·28, or ·30, according to the fatness of the animal; the result will be the weight of the carcass in imperial stones. The weight of the carcass is to the live weight of an animal, as 1 to 2, or a little more in cattle; as about 4 to 7 in fat sheep; as 2 to 3 in fat pigs. These proportions will vary according to the condition and breed of the animal.

Poultry.

LAYING COMPETITIONS.

A WELL-KNOWN English poultry-breeder, after discussing in the *Farmer and Stockbreeder* the value or otherwise of laying competitions, and of fancy breeds of poultry, says :—As a breeder of poultry and an exhibitor as far as twenty-five years back, and as one who has made a fair trial or two with every known breed, old and new, that has been to the fore these last thirty years, I beg to submit to utility poultry-keepers the following table of utility points of the different breeds of poultry that have come under my notice. Whilst so doing I may say that I take the class type of each breed as my criterion, and that I have compared the varieties fully, my diary notes extending over twenty-eight years, and covering in some years as many as 4,000 head of poultry under hand during the twelve months :—

A SCALE OF UTILITY POINTS OF THE DIFFERENT BREEDS OF POULTRY.

—	Size of Bird.	Table Quality.	As Layer.	As Sitter.	Size of Eggs.	How Hardy.	Total.
Andalusian	3	3	6	0	6	5	23
Ancona	3	3	6	0	5	4	21
Aseel	4	4	4	3	4	6	25
Brahma	6	4	3	5	3	5	26
Chittepratte	3	2	6	0	5	5	21
Cochin	6	4	2	5	3	6	26
Court Patte	3	3	5	5	5	4	25
Crève	6	6	4	0	5	4	25
Dorking	5	6	4	6	4	4	29
Du Mans	4	5	5	3	5	4	26
Favorelle	5	5	4	5	4	5	28
Game	4	6	3	6	3	6	28
Hamburgh	2	3	6	0	5	5	21
Houdan	4	5	5	0	6	4	24
Indian Game	5	5	3	6	4	6	29
Langshan	6	5	5	5	4	6	31
La Breese	4	5	5	3	5	5	27
La Flèche	6	6	4	0	5	5	26
Leghorn	2	3	6	0	5	6	22
Malay	5	5	3	5	4	6	28
Minorca	4	4	6	0	6	6	26
Orpington	5	5	5	5	4	5	29
Polish	4	4	2	3	4	2	20
Plymouth Rock	5	4	5	6	4	6	30
Redcap	4	3	6	0	5	6	24
Scotch Grey	5	5	4	5	5	6	30
Silky	2	2	4	5	3	3	19
Spanish	4	3	6	0	6	2	21
Wyandotte	4	4	4	3	4	5	24

Perhaps a much more useful comparison for egg-producers apart, and for breeders for table qualities by themselves, may be made, and scales giving the desired points allotted. Meantime farmers who stick to their old favourites—the Langshan, Dorking, Scotch Grey, Plymouth Rock, and Indian Game, and the first crosses they are in the practice of making therefrom with such satisfactory results—may rest assured that they are fairly in the swim as yet.

THE HEN CAME HOME.

A TIME probably will come when farmers will pay as much attention to the breeding and rearing up of good fowls as some of them do at present to the breeding of cattle, sheep, horses, and pigs. But that time will only come when the farmer becomes fully cognisant of the fact that more money is made in

countries such as the United States of America and some European countries by poultry than by the whole of the agricultural produce and live stock. For instance, the value of the wheat crop in the United States is in round numbers £48,000,000; of the cotton crop, £52,000,000; of the oat crop, £33,000,000; of the potato crop, £16,000,000; of the tobacco crop, £7,000.000; swine produce, £38,000.000. The poultry earnings reach £58,000,000; the eggs bringing £33,000,000 and the dressed poultry £25,000,000. The average value of the poultry—that is, roosters, hens, and chicks – is 1s. 3d. each; and of turkeys, geese, ducks, &c., 3s. 1d each. The value of the eggs is 7½d. per dozen. One year's earnings of the poultry are sufficient to buy up all the dairy cows in America, with £5,000,000 to spare. The same earnings would buy up all the gold, silver, wool, sheep, and tobacco produced in a year, and still leave £6,500,000 for other speculations. How is it done? Not by numerous immense poultry farms. Poultry farms where fowls are kept in great numbers rarely pay. Therefore the results must arise from the returns from thousands of farmers' poultry yards. On many of our farms no care whatever is taken of the poultry. They are of all sorts of mixed breeds. No new blood is imported. Hence they are in-and-in bred, degenerate specimens. The hens lay spasmodically, sometimes producing three eggs a week, sometimes seven, often none, and after laying a dozen or two of eggs they make up their minds to sit, and sit they will in spite of all efforts to prevent them. On some farms, the fowls are cared for—that is, they are stuffed with as much corn as they will eat, and consequently become fat and bad layers. They have no change of diet, and at night are housed in a crowded fowlhouse which is rarely cleaned out. There they also sit and become infested with vermin. Then a mysterious disease attacks them, and they die off to the astonishment of the owner. Now, of all places in the world, a farm is the place where poultry should thrive best. There are barns, outhouses, wheat and hay stacks, quiet nooks and corners, paddocks to run in, plenty of fresh water and fresh air, grain, green food, animal food when ploughing and harrowing are going on, caterpillars, worms, and grasshoppers. What more is needed to make poultry thrive? Then hens disappear for a time, and one fine morning a proud mother brings home from a dozen to sixteen healthy little chicks, all hatched somewhere about the land.

Now most children are fond of chickens, and on most farms there are children. Let every child have a hen or two for his or her "very own." The youngsters will very soon find out the favourite laying spots, and bring in the eggs. They will soon learn when their hens should be allowed to sit, and will anxiously look for the coming brood when, instead of having two hens, they will have two hens and two dozen chicks. They will, by-and-by, find that the result means plenty of pocket money with no expense and very little labour, and will redouble their attention to their feathered friends, and take the greatest pride in them. Let us try a little sum, premising, of course, that all calculations look very well on paper, but do not always pan out as they should. Let us take a well-tilled small farm whose owner is the fortunate father of four young girls and boys, old enough to do a little light work about the place. He gives each of these children two hens, with one rooster as common property. These will lay, say, 200 eggs each in the year, out of which they will bring up a couple of broods of 10 chicks each, leaving, say, 14 dozen eggs for sale. Supposing the hens to be all equally well cross-bred and equally good layers and mothers, the 8 hens will in the year produce 112 dozen eggs and 80 chicks. The eggs will produce an average of 6d. per dozen—that is £2 16s.; and if 50 of the chicks are fattened and sold, they would bring in, if sold at a proper time, at least 1s. each, making £2 10s. Now the sum of the results is: The children have a stock of 8 original hens and 1 rooster, and 30 young cocks, hens, and pullets to carry on with, besides having made £5 6s. in cash. Now carry the matter further. Let 100,000 farmers' and graziers', timber-getters', and bush workers' children do the same thing: the cash result of their operations would amount to £530,000 in one year, and to over £1,000,000 in the second year. But allowance must be made

for disease, unfertile eggs, snakes, rats, iguanas, and accidents; so we will deduct 50 per cent. from the above results, which will include cost of carriage to market. We still have a return of £260,000 and £520,000 for the first and second years' returns respectively.

Too little importance by far is attached to the poultry industry in Queensland. There is money in it. As we pointed out last December, a shipment was made per "Himalaya," from Melbourne in November, consisting of 1,720 cases, representing 412,800 eggs (34,400 dozen), or aggregating 86 tons. The eggs were sold in London at 1s. per dozen. The whole expenses, including purchase money, freight, packing, &c., amounted to 9d. per dozen, so that there was a profit of 25 per cent. on the shipment.

THE HOUSING OF POULTRY.

By G. W. J.

IT is not altogether necessary that, in order to erect a fowlhouse, a man should be an expert carpenter, as any person who is at all handy with tools can soon put up a good substantial shed for large numbers of fowls, and at a very slight cost. Where a few fowls only are intended to be kept for the purpose of supplying household demands, a building can be put up with an outlay of only a few shillings for building material; while those who intend to go in for poultry-raising on a large scale will require much more commodious buildings, and, consequently, will require more capital. If the buildings are to be on an extensive scale, it will probably be more economical to employ a tradesman, but, if the intending breeder has time and an inclination for joinery, perhaps it would be as well if he, with an assistant, undertook to do the building of the houses, sheds, &c., himself. If the houses are built by the breeder personally, much more interest will be taken in the pursuit than if done otherwise. Perhaps you have already some houses on your land that are at present unoccupied, such as sheds or stables, which may be adapted for the purpose, and will thus render unnecessary any further erection of buildings. The house or houses should be carefully examined to see if they are thoroughly dry above and below, for dampness would not only prevent the fowls from thriving and laying, but would bring about many kinds of disease common amongst fowls not properly attended to. The houses, whenever possible, should be light wooden structures, as they dry much more rapidly after rain than brick ones. Great care should be exercised in selecting a piece of suitable ground upon which the fowlhouses are to be erected. It must be well drained and have a good aspect, as a bad ground-floor is always damp, and in many cases more dangerous than a defective roof; but both should always be avoided if the breeder is to be successful. If the ground is damp, and remains so, 15 or 18 inches of the soil within the entire surface of the building should be excavated, and replaced by coarse gravel, broken brick, and small stones, and if sand is plentiful I would advise that a good layer of same be put all over the floor, as it is a first-class disinfectant. A compost of lime, ashes, and sand will also be found serviceable, just sprinkling sufficient water on the mixture to settle it firmly; and if it were not for cement being so hard and cold, it would be everything that could be desired for a flooring material. Brick floors have likewise a disadvantage, inasmuch as the fowl manure gets between the cracks, and causes an unpleasant odour, which affects the health of the birds.

Ventilation is the next item we have to consider. This is a matter of very great importance, and one that, if thoughtfully looked after, can easily be secured. No animal of whatever breed can grow and live if it does not get the requisite fresh air, and when we recognise that fowls spend one-third to one-half of their time in the houses you will see the importance of having a thoroughly clean and well-ventilated place. Without a fresh supply of air the oxygen soon gets exhausted; and without oxygen, animal life cannot be maintained. It is not likely, however, that the atmosphere will become so impure as to cause death to the fowls, yet it will cause them much injury, and prevent

them from being profitable by retarding their laying. A good strip of wire-netting or perforated zinc, about 1 foot wide, placed round two sides of the building, just under the roof, will afford ample ventilation. The roof, on the sides where the netting or zinc has been placed, should be allowed to project about 1 foot from the walls, in order to prevent the rain drippings from falling on the inside of the house, and thus making the floor damp and unhealthy. A piece of zinc may be placed at one of the gable-ends of the house, and a blind so fixed that it can be moved up and down; or a shutter may be put up, to be closed in winter, when the weather is cool, or during rain. The shutter should be left open in the daytime in winter, and be closed at night

The houses should always be kept well whitewashed, as by this means all insects will be kept down. Put plenty of lime in the solution. The perches should be next arranged, and the house will be then ready to be occupied by the fowls. The perches should always, whenever practicable, face the light, as fowls always roost with their faces in that direction; and great care should be taken not to have the perches too high—rather have them a little low—for birds such as Cochins, Brahmas, Dorkings, &c., are liable to injure themselves when flying down, and for this reason I would recommend that they be adjusted not more than 18 inches from the ground, and up to 5 feet for fowls such as Leghorns, Minorcas, Game, &c. The perches should be round, about 1½ inches in diameter; saplings of that diameter, with the rough notches taken off, make excellent roosts. Ordinary kerosene boxes divided into two compartments will be found to make very good nests, a good layer of fine ashes being put upon the bottom to a depth of about 5 or 6 inches, then a sprinkling of lime, and, lastly, a good thick layer of straw with a china nest-egg in each compartment—taking care to remove all fresh-laid eggs at sundown. The nest-boxes will be the better for being kept in a fairly dark position, and should be put in a room separated from the roosting sheds, if possible, as all fowls will then be prevented from roosting on the edges of the boxes. By putting lime in the boxes, lice, &c., will be kept down, and the hens will be much more comfortable, especially when rearing chickens. The nests should be overhauled every six months, and new lime, ashes, and straw put in.

In large yards, where great numbers of chickens are hatched annually, it will be found necessary to have a shed built in which the coops can be arranged for the first week or two after the chickens are hatched, or when the weather is wet, as wet weather is highly detrimental to chickens at that stage of their existence. The building will be found to be of immense value, and the mortality amongst the chickens will be very much reduced. This shed is not only useful in the above way, but, as the young birds have to be fed the last thing at night, a shed of this sort to feed them in will be found most convenient. In the shed a lantern should always be at hand, which will throw sufficient light to see all round the building. The position of the shed is an important consideration. The site on which to build a fowlhouse is one which faces the south, south-east, or south-west, but never north-east. The floor should be very dry to the depth of several inches, and it would be as well to follow the advice given *re* floor of fowlhouse. Upon the floor a good layer of sand about an inch thick should be placed, and, if kept in order, it will always be dry and sweet, and the coops can be placed on it without bottoms. The sand should be raked over daily, and renewed every six months. The house should be perfectly dry and be in the vicinity of the owner's residence, in order to facilitate the attention that must be paid to the sheds, chicks, &c., if poultry-farming, as far as housing goes, is to be a success.

NEEDED REFORMS IN POULTRY JUDGING.

IT is highly necessary that the committees of management of agricultural shows should ask themselves the question whether they are spending the funds of the societies in a wise and legitimate manner as regards the poultry exhibits

when such form a part of the programme of an ordinary agricultural show. We have little hesitation in saying that, so far as any real useful purpose is served, in two respects at least, the present system of prize-giving is a waste of money, if not mischievous in effect. Let us explain. In poultry shows pure and simple, they are displays of purely fancy articles, and the "fancies" are triumphant. It is their day out, and their legitimate hunting ground for prizes, but agricultural show committees should direct their energies and funds to the encouragement of the useful qualities of poultry. And we would point out that there are two classes of poultry, at least, that should never be encouraged at an agricultural show, and they are bantams and the fighting variety of the game breed. In the name of common sense what economic value can there be in bantams? As a breed they are indifferent producers even of numbers of eggs, and the size of the eggs is such as to place them beneath notice. Their presence at an agricultural show is a mistake, and to give prizes for them is a mistaken application of funds which should always be given with a useful purpose in view. Let it be clearly understood that we are not attacking the question of keeping such birds (they are scarcely worth the name of poultry) for amusement or recreation, but on the score of utility for such toys to have such a large recognition in an agricultural show is surely a mistake, as they are of very little more use than so many canaries or tame starlings. And as for the present day game that we see at the shows, they are little better than monstrosities. Of true economic value they have none. The four points accurately aimed at are—length of leg, length of neck, strength of beak, and feather-marking. If anyone can show that any of these features are of true economical value, and assist in developing flesh or egg production, we will at once acknowledge our error, and apologise. These disparaging remarks do not apply to the old English game, which are not only fairly good layers, but are amongst the most perfect table birds in existence. Then there is that other common mistake which has wrought so much mischief, and that is the craze for mere feather-marking. It is time that the judges at agricultural shows were instructed to give special value to egg and flesh producing features, and less to mere colour and marking of feathers. Any judge who is worth his salt knows, by the general form and appearance of hens, whether they are likely to be good layers or not. Then more distinction, or value, should be given to wealth of flesh in the best parts and smallness of offal. In these respects, the French judges and breeders are ahead of us, taken as a body, and we should do well to adopt their methods. Coarseness of bone and redundance of feather, together with thickness of neck, are scouted by them, and no mere colour or accuracy of marking will atone for the defects named. The celebrated Sussex fowls, which invariably fetch the highest price in the London market, are simply fowls that have been bred for ages with the view to producing a large amount of rich, juicy flesh with a small amount of offal. Feather-marking and colour are entirely ignored.—*Scottish Farmer.*

UNFERTILE EGGS.

A SKILLED eye can tell the difference in three or four days, but it will be better for you to wait until the eighth night. Go to the sitting-house when it is quite dark, and take with you a candle or lantern, preferably of the bull's-eye type, and a fresh-laid egg. Take the latter between the forefinger and thumb, so that it is surrounded by a dark frame, and hold it up to the light. It will be clear and transparent, nothing dark showing behind the shell. Now take the eggs, whether fowls or ducks, one by one from under the hen, and examine them in a similar way; the unfertile will look like the fresh egg, the fertile will show dark patches behind the shell. The difference should be at once apparent; but if you are doubtful about any, it is safer to mark them and replace, and test again a day or two later. The unfertile should be removed and hard boiled for the future chicks.—*Farmer and Stockbreeder.*

The Orchard.

FRUIT CULTURE IN QUEENSLAND.

By ALBERT H. BENSON.

CITRUS CULTURE.—Part II.

Having selected a suitable soil and a favourable situation for the citrus orchard, the next thing is to set about the preparation of the land so as to get it into a suitable condition for laying out and planting. These general operations, which are applicable to the growing of all kinds of fruit, have already been fully described by me in Part II., Vol. I., of the *Queensland Agricultural Journal*, but, as some of my readers may not have had an opportunity of reading what I then wrote, I will give a brief *résumé*. There is an old adage to the effect that if it does not pay to do a thing well it certainly will not pay if done badly; that is especially applicable to the preparation of the land for citrus culture, as it is practically impossible to prepare the land too well. The future success of the trees largely depends on their getting a good start, and nothing is more conducive to a good start than having the land in the right condition for planting. It is much better to get the land ready first and to plant afterwards than to plant the trees as soon as the land is cleared and then prepare the soil. The land should be well cleared and well stumped, so as to leave as few roots in the soil as possible; as when large roots are left in the soil there is always the danger that, whilst they are decaying, root fungus will be conveyed by them to the roots of any citrus trees that may come in contact with them. If the right soil has been chosen as described in the first part of this article, and the clearing has been well done, the breaking-up of the soil is not a difficult matter, and subsoiling will not be necessary. On the other hand, if the subsoil is of a hard or tenacious nature, subsoiling must be carefully carried out so as to render it sweet and friable, provide good drainage, and permit the roots of the trees to permeate it freely. Lands that require subsoiling should, as a rule, be avoided for citrus culture, as they are not the most suitable for the growth of these fruits. The method to be adopted in breaking up the land depends on its condition, as, if covered with a heavy sod of couch, blady, or other grasses, it is not advisable to plough too deeply at first, but to just go below the sod. The land thus broken should be well harrowed with a heavy breaking harrow, so as to get all the roots of the grass to the surface, where they will soon be killed if the weather is favourable. The land should then be cross-ploughed as deeply as you can, and left rough, so that it may become thoroughly sweetened and ærated. When this has taken place, the land should be well harrowed and again cross-ploughed, this third ploughing being deeper than the second. The object of this third ploughing is to get the land as deeply worked as possible, so as to have a large quantity of soil in a state of fine tilth. If there is no surface grass or sod, then the first ploughing can be deeper, but the subsequent treatment of the land should be similar. The greater depth of soil you can reduce to the state of fine tilth, the better for the trees and the better the soil will retain moisture during a dry spell. A thorough preparation of the soil also tends to develop those micro-organisms which have the power of converting the insoluble nitrogen and ammonia in the soil into soluble nitrates that are easily assimilated by the plant or tree grown therein. This power of producing soluble nitrates in the soil, which is known as nitrification, is often somewhat deficient in raw virgin land, but is increased by the sweetening of the land and by the decay of the vegetable matter that is contained in it, and which the ploughings and harrowings have thoroughly mixed with the soil.

On no account should trees be planted on raw or unsweetened land, as it is better to wait a few months and have the land in good order rather than plant on such land. When the soil is ready for planting it should be laid off in squares, the method of doing this being fully described in the article I have already referred to. Planting in squares is by far the best method, as it gives the trees more room and is the easiest for cultivation. Don't crowd your trees; give them plenty of room. You will find that it will pay you in the long run. Many growers make the great mistake of planting their trees too close, and only find it out when the trees are getting into good bearing by their having to cut out a number to prevent overcrowding. Close planting certainly gives the orchardist a quicker return for his outlay, but in a few years the trees become so crowded that their roots occupy every inch of the ground, and the tops are so near together—if not actually crossing—that horse cultivation is impossible, the soil in consequence becoming firm and hard and neither absorbing nor retaining moisture well.

Close planting requires heavy and frequent manuring in order that the fertility of the soil may be maintained, and even then the crowded state of the trees prevents them from properly developing either their wood or their fruit. Close planting causes the trees to suffer from want of moisture during dry spells very much more than they would do were they planted at the right distance apart, and it has also the further disadvantage that it is conducive to the development and spread of both insect and fungus pests.

Close planting has also one other great disadvantage, in that trees so planted are much more difficult to treat for fruit pests, either by means of spraying or cyaniding, on account of the want of room to get at and around the trees properly.

On good citrus soil no seedling sweet oranges, sevilles, or mandarins should be planted nearer than 30 feet apart each way, and in the case of extra good land even wider planting is necessary. Worked trees of these varieties can be planted rather nearer if desired, say 26 feet by 26 feet, but I doubt much, when they come into full bearing, if 30 feet each way will be found too much. In my opinion the wider planting will be found to produce the best results both as regards quality and quantity, and that the larger average returns per tree that are obtained will more than make up for the extra number of trees when they are planted nearer. Limes and citrons can be planted at from 15 to 20 feet apart, and lemons and cumquats at from 20 to 24 feet apart each way. These distances are all for good citrus soils in coastal Queensland, in districts where there is a good rainfall, and where the trees make a vigorous growth. In drier and warmer districts, even where water is available for irrigation, the various citrus trees will not make as great a growth as they do on the coast; consequently they can be planted closer without injury.

Where wide planting, such as advised, is carried out, crops may be grown between the rows of trees for the first five years, provided that they are not allowed to encroach upon or rot the feeding roots of the young trees, and that the land is well and deeply worked and well manured.

The best crops to grow are those that are planted in drills or rows, such as corn, sorghum, sweet potatoes, peas, beans, cow peas or other leguminous crop, tomatoes, &c.; but the growing of cucurbitous plants, such as pumpkins, water or pie melons, &c., is not to be recommended. The growing of cereals, such as oats or barley, either for green fodder or hay, is not advisable, as, unless they are kept a good distance away from the trees, they are apt to exhaust the moisture in the soil, and consequently injure the trees.

If the growing of the right kinds of crops is carefully attended to, and the land is thoroughly and deeply cultivated and well manured, the land, instead of being impoverished, will be actually improved and in better order than if it had been kept uncropped and well worked the whole time. The growing of crops between the trees whilst they are young, has also the further advantage that if the orchard is planted on a slope the crops so grown tend to prevent the washing away of the soil during heavy rain. At the same time it will not do to grow

the crops without manure, and thus impoverish the soil, as when the citrus trees come into bearing they will require all the plant food they can get, and not a worn-out soil, if you want them to make a good growth and produce heavy crops of fruit.

Having the land ready for planting, the next question is, What are you going to plant? And this at once opens up the very debatable matter in the merits of seedlings and worked trees, which I will endeavour to deal with as clearly as possible.

What to Plant.

A large number of growers pin their faith to seedlings on the grounds that they are hardier, less liable to disease, and more reliable in every way than worked trees. Past experience has undoubtedly shown that, in the majority of cases, seedlings have been the most satisfactory trees to grow both as regards the health of the trees and of the quality of the fruit; but this, in my opinion, is largely, if not entirely, due to the fact that, until quite recently, the bulk of the worked trees were either budded or grafted on unsuitable stocks, principally the common lemon, which were entirely unsuited to our soils and climate. Many thousands of worked citrus trees have been imported during past seasons into this colony from New South Wales, practically the whole of which were on common lemon stocks, and have in consequence turned out a failure here. The failure of these trees is to a great extent responsible for the preference so commonly given to seedlings, as not only have the trees done badly, but the fruit they have produced has been in many cases inferior to that of seedlings. The production of this inferior fruit is due to the fact that the scions from which the trees have been grown have been obtained from trees of little value instead of from choice selected varieties of proved merit.

Although seedlings have many good qualities, they have also many bad ones. They are usually very thorny, and are dense growers, requiring heavy pruning.

They are more or less uncertain bearers, having a good crop one season and little or none the next. The shape, size, and quality of the fruit are uneven, and there is no certainty of propagating any particular type. Some of our seedlings produce undoubtedly first-quality fruits, but a large number are decidedly inferior, and all have the drawback of containing a considerable number of seeds.

Worked trees, when budded or grafted on suitable stocks—viz., the sweet orange seedling for sweet oranges, and the emperor or scarlet mandarin seedling for mandarins, the seeds producing sweet stocks being obtained from fruit grown on vigorous, healthy seedling trees—are fully as hardy as seedlings, and have many advantages over them.

Worked trees of the best selected varieties are usually free or nearly free from thorns; are vigorous growers, but not as dense as seedlings; come into bearing early, and bear heavy crops of fruit annually. The fruit of each variety is nearly all of the same type, and generally fairly even in size. In some varieties it is quite seedless, and in others nearly so, and the quality of all the selected varieties is good. When a grower has a particularly fine seedling that he wishes to propagate—either an orange or mandarin—the best way is to plant the seeds of same, and; when the seedlings are large enough, to bud them with wood taken from the same tree, as this will secure plants having a sound constitution, and enable him to produce fruit similar in every respect to that grown on the parent tree, whereas seedlings from same could not be depended upon to come true to type. Although worked trees have turned out such a loss and disappointment in many instances, there are cases of old worked trees growing side by side with seedlings that are equally as vigorous as the seedlings, and have proved themselves to be much more reliable and constant bearers, and decidedly more profitable in the long run. This experience is borne out by citrus-growers in all parts of the world, and seedlings are the exception and not the rule.

In some parts of Europe, seville oranges are very commonly grown as seedlings, but in the same districts the sweet orange is nearly always a worked tree. In America the fruit from worked trees of selected varieties always fetches a much higher price than that of seedlings, as no trees are worked unless they prove to be of the best quality or possess special qualifications, such as extreme earliness or extreme lateness. What has taken place in other places will, I believe, occur here at no very distant date, and the worked tree to a great extent supplant the seedling.

PROPAGATION OF STOCKS.

In order to obtain good stocks—that is to say, strong healthy stocks having a vigorous constitution—it is necessary to plant seed that is obtained from thoroughly ripe fruit grown on vigorous healthy trees, preferably seedlings. The seeds should be planted as soon as they are taken out of the fruit, all shrivelled and malformed seeds being rejected. The soil for the seed bed should be carefully selected and well prepared. It is best to be of a sandy, loamy nature, containing plenty of organic matter, such as decaying leaf mould, so that if it is necessary to water the young plants, the soil will not set. Such a soil will produce plenty of fine roots rather than one long tap root—a great advantage when the tree has to be transplanted to its permanent position. Mark the seed bed off in shallow drills 2 to 2½ inches deep and 1 foot or so apart; sow the seed fairly thickly in the drills and cover. Keep the ground between the rows well worked with a Dutch hoe, and water the young plants when necessary. In order to prevent the scalding or burning of the plants in the seed bed, they should be protected from the direct rays of the sun, a light framework of saplings covered with a few bushes answering this purpose very well. Do not cover the young plants up too much, or they will become weakly; all that is necessary is a thin screen to break the direct rays of the sun.

Leave the plants in the seed bed for from ten to twelve months, when, if they have made a good growth, they should be taken up and carefully graded. All those having twisted or curly roots should be rejected, and the balance should have their roots carefully pruned and be then transplanted into nursery rows, such rows to be about 3 feet apart and the plants from 6 to 8 inches apart in the row. If the weather is at all dry, the young plants should receive a slight watering when transplanted, as this will tend to settle the earth round them and prevent their drying out. The plants are kept well cultivated in the nursery rows, all the lower side growths are removed, and the young tree trained to a single stem. When the stocks are large enough, say in about twelve months after they have been set out, or less when grown under favourable conditions, they are ready for working. If the trees are to remain as seedlings, they should remain in the nursery rows till large enough to set out in the orchard, say till they are from 4 to 6 feet high, and with a stem of from ½ to ¾ inch in diameter.

METHODS OF PROPAGATING WORKED TREES.

There are three methods of propagating worked trees—viz., layering, budding, and grafting. For commercial purposes, the last two methods only are employed, and budding is much more common than grafting, and is, as a rule, preferable to it. The various methods of budding and grafting have already been illustrated and described in this *Journal*, so that I have no need to go over this matter again. The secrets of success in budding citrus stocks are, first, to see that the buds are full and well developed; second, that the stock is in good working order—viz., that the bark runs freely; third, that the bud is cut thin; and fourth, that it is inserted into the stock as soon as it is cut and tied firmly into its place. In cutting the bud use a very sharp knife; do not take any of the wood out of the bud, simply cut it thin. Budding can be done at any time that the bark will run freely, provided suitable buds can be obtained, but grafting can be done most successfully in the spring of the year. As soon as the bud has taken, if you wish to start it, cut back the stock to a few inches above the bud.

This will cause the bud to start growth, and will also force all the dormant buds on the stock itself. The latter must all be rubbed off, and, unless the bud is growing upright, it should be tied to the portion of the stock that is left above it. In most cases it is advisable to stake all buds and grafts so as to produce trees with well-grown straight stems. All side branches should be removed and the young plant trained to a single stem, so as to produce a tree and not a bush, as is the case when the bud or graft is allowed to form a number of branches as soon as it starts to grow. In propagating worked trees the first thing is to be sure that your stocks are right—viz., seedling scarlet or Emperor mandarins for all mandarins, and seedling sweet oranges for all varieties of oranges and lemons. Cumquats may be worked on seedling cumquats or seedling mandarins; limes and citrons on common lemon seedlings, but this last-named stock should never be used for anything else. Having secured good stocks, see that you get good scions from vigorous, healthy, prolific trees of well-proved merit, and you will thereby produce trees that will have all the good qualities of their parents, and on which you can thoroughly depend.

Planting.

If the land has been prepared as described, planting is a simple matter. First of all trim the roots of the young tree, carefully cutting off all bruised and broken roots, and shorten back any straggling roots. In digging the hole for the tree, put the top soil on one side and the subsoil on the other, and only take out enough to give you sufficient depth to enable you to set the tree at the same depth at which it stood in the nursery, and to permit of the roots being properly spread out. There is no necessity whatever to dig very large holes, as if the land has been well prepared it is entirely waste labour. In digging the hole for the tree, see that the centre of the hole is slightly higher than the sides, so that the roots will tend downwards instead of upwards. When the tree is set in its right place by means of the planting board, scatter a little of the fine top soil over the roots, and work it carefully between them, continuing this till the roots are all well spread out and covered. If the soil is at all dry, the tree should now receive a watering of one or more 4-gallon buckets of water; and when this has soaked in, the hole should be filled up to the surface with the dry soil. This is far preferable to surface watering, as it does not cake the ground. The water is placed just where it is wanted, and the dry soil put above it prevents surface evaporation, and tends to retain the moisture. There is no necessity to stake the young tree, and if it has been headed in the nursery no cutting back is necessary; on the other hand, if it has not been headed, then it should be cut back to a height of about 18 inches and allowed to develop 3 to 4 or 5 branches with which to form the head of the tree.

THE DWARF SYSTEM OF GROWING DECIDUOUS FRUITS.

By JAMES PINK.

A few years ago the eminent horticulturist, the late Shirley Hibberd, when addressing the Fellows of the Royal Horticultural Society at South Kensington, startled the horticultural world by saying:—"I am fully persuaded that our present system of pruning deciduous fruit trees, by inducing them to make strong growth and then reducing it by cutting away the greater portion of the new growth and sending it to the fire heap, is radically wrong." Vegetable physiologists have held that, by the usual system of winter pruning, a great part of the strength and usefulness of the tree is wasted. To remedy this, several systems have been tried, such as the cordon, the pyramid, and others. It is well known that the finest fruits produced in the world are grown on the cordon system around Paris, where the sides and banks of the railways are covered with cordon trees, and the finest fruits thus produced are sold in Covent Garden

at 3s. each, and in the Paris markets at 4 francs each. However fine the fruit grown on the cordon principle may be, the system is not suitable for general culture. Nevertheless, the principle was right, and the question was how to bring it into practical use so that fruit of the finest quality could be produced in abundance with the least possible strain upon the tree, and Hibberd maintained that this could be done; that when training the young tree, instead of cutting away the wood, it should be bent and tied down to a certain angle, and the tree pruned in summer instead of winter; and practice has proved that the theory was correct, even here in Queensland.

When at Toowoomba a short time ago, I visited Mr. Horsfall's orchard at Drayton, where there are about a thousand apple-trees grown on Shirley Hibberd's system, although the owner had never heard of Hibberd or his theory. But the idea appears to have been identical—that there was something radically wrong in cutting away all the best wood; so Mr. Horsfall adopted the plan of tying down the branches to a suitable angle, combining with it summer pruning, and it is proving an eminent success. The trees are in various stages of growth, for Mr. Horsfall began with a few trees at first, but, finding them to thrive and fruit so well, he continued year by year to take out less payable kinds of fruit trees and to replace them with apples, because the apple crop, under this system, is the best paying crop in the orchard. The fruit are first-class both in size and quality, always find a ready sale, and realise top prices in the market.

This system of growing fruit has many advantages over the usual styles. The trees are kept low, about 8 feet in height, and therefore suffer little from the wind; the fruit is always under observation, and can be thinned at will, and any disease can be immediately noted. No ladders or steps are required to collect the fruit or for pruning the trees. The latter should be planted 15 feet apart; this gives 193 trees to the acre. The apple bears its fruit on wood more than one year old, but chiefly on spurs, so that, by bending down the one-year-old wood to the required position, the tree is induced to make flower-buds rather than so much wood growth. By bending the branches, the cells through which the sap circulates become ruptured, and the interchange between branch and root practically ceases. The operation, though somewhat different, gives practically the same results as ringing. Ringing is an operation carried out in Europe by growers who intend to show their fruit at any of the great fruit shows. Ringing consists in removing a strip of bark right round the branch at the back of the fruit. This answers best with apples, pears, and grapes. Fruit thus treated is larger, finer in quality, and ripens earlier. Physiologically, science explains the phenomenon thus:—"The true sap of trees is wholly generated in the leaves from which it descends from their bark to their root, depositing in its course the matter which is successively added to the tree, whilst whatever portion of such sap is not thus expended sinks into the alburnum and joins the ascending current, to which it communicates powers not possessed by the recently absorbed fluid. When the course of the descending current is intercepted, that sap naturally stagnates and accumulates above the ruptured place, whence it is repulsed and carried upwards to be expended in an increased production of flower-buds and fruit." This fully explains the reason that the fruit is finer on the branches of the apple-trees that are bent down as already described.

I have little doubt that when the system of summer pruning is better understood it will revolutionise the present methods of growing deciduous fruits. Under this system the skilful operator has the trees so entirely under control that he can almost command a crop at will. The pruner should possess a thorough knowledge of the laws which regulate the action of the organs of vegetation.

The quantity of wood that a tree forms, the amount and quality of its flowers, the size of its fruits—in short, its whole beauty and value—depend upon the action of its branches and leaves and their healthiness. The object of the pruner is to diminish the number of leaves and branches so as to strengthen

those that remain. When the principle is understood by the operator, the work is so very simple and easy that a woman could perform it.

Dwarf culture will enable the cultivator to plant about 200 trees per acre, and by adopting summer pruning he will have the trees immediately under his control. The art of summer pruning is in itself very simple. As soon as the tree starts into growth it must be gone over and all the misplaced buds rubbed off; the young shoots pinched back to induce them to form fruiting spurs next season, depressing the stronger portions of the tree to help the weaker, and by so doing throwing the whole strength of the tree into its foliage and fruit.

This system was adopted by Mr. Rivers, of Sawbridgeworth—the home of English fruits; and he stated that it proved successful with him far beyond his expectation.

[The above system of dwarf culture is interesting and of much value to owners of small orchards. It is, however, the experience of expert orchardists that, for large areas, the trees should be planted at least 25 feet apart, and would be better and bear more freely and regularly if they were set 30 feet apart.—Ed. *Q.A.J.*]

A SOUTH AUSTRALIAN OPINION.

Taken in connection with Mr. Pink's article, the remarks by Mr. A. Harper, hon. secretary of the Golden Grove Branch of the Agricultural Bureau of South Australia, will be read with interest. He directed attention to an article appearing in a daily paper which contained the following:—"The apple orchard, which is a picture, comprises seven-year-old trees planted 20 feet by 24 feet. Last year, which was not the best of seasons, each tree yielded on an average eight cases. This, at 2s. 6d. a case, means £1 a tree." This statement, analysed, means 560 bushels, or £70 per acre per annum for a handy little orchard of 10 acres, at an actual outlay for the first seven years of, say, £500. The hon. secretary's experience, so far, had been different. This year his biggest crop yet from about 4 acres of apples, ranging from eight to thirteen years old, will be considerably less than 200 cases, inclusive of waste caused by wind and birds. This want of success he attributed a good deal to injudicious management, but did not think that with the best of management it could be more than doubled at that age—or, say, from 80 bushels to 100 bushels per acre. He did not agree with the generally accepted formulæ of pruning, especially of the apple, than which, possibly, no other tree is so frequently in want of sturdiness to bear heavy crops of fruit. He had, therefore, come to the conclusion that for strength the nearer the apple approaches to the natural shape of the pear the better. Low pruning is certainly very well if easily-picked and well sun-burned fruit is required, and if there is no objection to digging on the knees in winter. He thought apple-trees are still planted too closely. A thirty-year-old tree had already covered a space of more than 30 feet in diameter, and was nearly 30 feet high. It is well known that isolated trees in favourable soil will grow and increase in productiveness for many years after those in the middle of an orchard are either dead or useless. The members would be pleased if other branches would give information as to phenomenal crops and probable crops of apples under favourable and varying conditions, also as to age and any other circumstances.

THE WATER HYACINTH.

THE *Engineer* says that the American water hyacinth, which has caused much trouble in overgrowing the rivers, and is not infrequently an obstruction to navigation, has been successfully killed on the Melpomene Canal, New Orleans, with chemical spray.

Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

By F. MANSON BAILEY F.L.S.

Order SCITAMINEÆ.

ZINGIBER, Adans.

Z. officinale, *Rosc.*, **var. Cholmondeleyi.** Queensland Ginger. Rhizome as in the common form. Leafy stems 2 to 4 ft. high. Leaves numerous, the middle ones on the stem exceeding 1 ft. long and 1 in. broad at the centre, shortly petiolate at the base above the sheath, the points thread-like; the ligule extending 4 or 5 lines above the attachment of the lamina. Scapes 1¼ to 1½ ft. high, with numerous obtuse or emarginate stem-clasping bracts, sometimes bearing laminæ. Spikes ovoid or cylindric, about 3½ in. long and 1¼ in. diameter. Outer suborbicular bract about 1 in. diameter, upper scarious margin pale-yellow. Flower-buds yellow, subulate; when first appearing from behind the the outer bract it gives to that organ the appearance of being cuspidate. Inner bract about 10 lines long, greenish towards the end, enclosing the calyx. Calyx hyaline, tubular in the lower portion. Corolla-tube slender, white, enlarging upwards, about 12 lines long. Segments 3; the lower ones 3-nerved, imbricating; posterior one 9-nerved, larger and hooding over the stamen and style; all about 9 lines long, lanceolate, yellow. Labellum 3-lobed, about three-quarters the length of the other segments, middle lobe oblong, margins incurved, undulate, purple blotched with yellow; the centre or disk yellow, speckled with purple; lateral lobes erect, ovate, embracing the stamen below the anther, purplish with yellow blotches, attached near the base of labellum. Anther white, connective narrow, incurved, horn-like, dark-purple. Style glabrous, filiform, with a ciliate ring encircling the stigma. Stylodia rather long.

Hab.: Cape York Peninsula, inland from Somerset, *Cholmondeley Jardine.* The plant from which the present description and illustration were taken was grown by Mr. P. Mac Mahon, Curator of the Brisbane Botanic Gardens, from a rhizome which I brought from Somerset in 1897. Besides being a good commercial ginger, it is of interest from being the first of the genus met with in Australia. In a paper read at the January, 1898, meeting of the Australasian Association for the Advancement of Science, I referred to this ginger as being very free of fibre, a feature which should recommend it as particularly suitable for preserving. The plant seems to take kindly to the Brisbane climate.

Explanation of Plates.

Plate CCI.—Portion of plant showing leafy stems and scape; one-eighth natural size.

Plate CCII.—Flower-spike showing single flower, nearly natural size; 3 portions of same all more or less enlarged; labellum natural size.

Plate CCIII.—Fig. 1. Portion of the leafy stem showing ligules.
Fig. 2. A ligule flattened out.
Fig. 3. Flower opened out to show the calyx: A, outer bract; B, inner bract; C, calyx; D, anther; E, connective; F, style; G, stigma.
Fig. 4. (*a*) Ovary; (*b*) stylodia; and side view of anther.
Fig. 5. Outer bract (flattened out).
Fig. 6. Inner bract (flattened out).
Fig. 6*a*. Inner bract (closed).
Fig. 7. Calyx.
Fig. 8. Corolla segments.
Fig. 9. Ovary (longitudinal section).
Fig. 10. Ovary (transverse section).

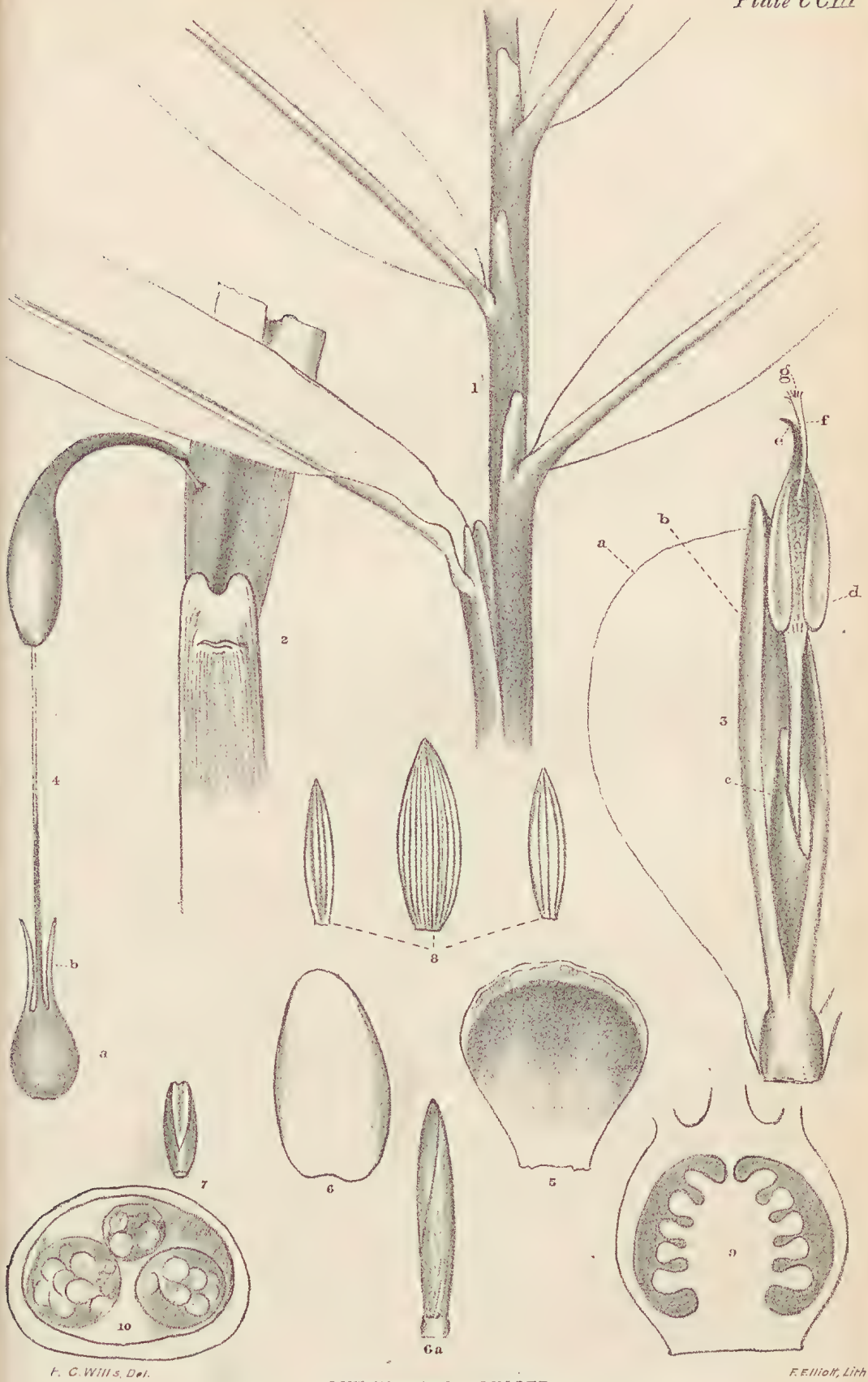
Plate CCI.

ZINGIBER OFFICINALE, var. CHOLMONDELEYI.

Plate CCII.

ZINGIBER OFFICINALE, var. CHOLMONDELEYI.

Plate CCIII



F. C. Wills, Del. F. Elliott, Lith

QUEENSLAND GINGER
(ZINGIBER OFFICINALE, var. CHOLMONDELEYI).

Horticulture.

THE BULB INDUSTRY IN HOLLAND.

By HENRY A. TARDENT.

In our sunny Queensland, where all the flowers of tropical, sub-tropical, and temperate climates can be grown outdoors, few people realise to what perfection the extensive cultivation of flowers has been brought in some countries which would scorn to be debarred by their climate from such an enjoyment. These reflections came to me on reading in the *Gazette de Lausanne* an interesting *résumé* of the annual report of the *Bloemister Vereeniging* of Holland. It contains many facts which I am confident will prove of interest to the lovers of flowers in this country.

As is well known, the city of Harlem has been, for centuries past, the centre of the propagation, cultivation, and commerce of tulips, jacinths, and other bulbous plants. That crop covers now a vast stretch of country, extending from the Hague to Alkmaar. Like Ghent, the name of Harlem is known throughout the civilised world as that of the "City of Flowers." Floriculture has reached there an unexcelled perfection. Millions and millions of bulbs are being sent annually throughout the world, wherever civilisation has evolved a taste for flowers. This is especially the case with cold countries.

To visit that part of Holland during April or May is to enjoy the unique sight of thousands of acres of bulbous plants, all in full bloom and presenting all possible combinations of colours and shapes. There are at least from 3,000 to 4,000 acres under that flower crop! And, as the plants do not thrive on the same soil for many years in succession, a fallowing is required, so that the total acreage devoted to the crop must be about double the above figures. Some bulbs, like the jacinth, for instance, require higher lands; others, like the tulips, do better on the lower lands. For all, however, the soil should be sandy, neither too dry nor too wet. For summer, as well as in winter, the water should be at the same level, not far below the surface. Windmills and steam engines are being used to maintain the water at the proper level.

Most of the plants are put in from August to September (autumn months there). In April and May (spring) they come into bloom, showing their splendid and delicate tints, and emitting a most sweet perfume which permeates the whole surrounding country.

During those months, foreign horticulturists flock thither from all parts of the world to make their purchases, which are usually effected by public auction.

Those beautiful flowers are simply cut off and thrown away as of no value whatever.

In June and July the bulbs are dug out. The sold ones are sent away at once to their respective destinations, whilst those unsold are stored in open sheds (homgars) to be sold during the autumn months.

A jacinth bulb must be from three to four years old before reaching its full value and can produce the magnificent flowers so much admired in a drawing-room.

The £ s. d. of the business seems to be all right, too. A single hectare (about 2½ acres) produces as much as 24,000 florins, or £2,000 worth of bulbs per annum. It goes without saying that good bulb land fetches exorbitant prices, reaching sometimes up to £1,000 per acre. The industry contributes largely to the general prosperity of the country. It is carried on by over 1,000 floriculturists, who employ over 3,000 hands. The export of bulbs from Holland is said to reach 6,000,000 of francs annually.

No doubt in years to come, when civilisation is more advanced, when there will be more leisure than is usually available to the pioneer in a new land, an ennobling taste for flowers will also develop in our midst, and fortunes will be made in that branch of farming.

In the meantime, let everyone blessed with the possession of a home make it homely and attractive by surrounding it with a few of the less exacting flowers. Our opportunities in that direction are perhaps unique in the world. Let us then rise up and be equal to them. A few small beds of flowers round the family home are a constant source of pleasure, enjoyment, instruction, recreation, and in years to come, when we are wandering through the world, of the most pleasant recollections connected with our childhood.

SALICYLIC ACID—A WARNING.

THE *California Fruitgrower* says:—The use of salicylic acid or other similar chemical as a preservative of food or food products is indefensible. Whilst granting that, in many instances, the dangers arising from this cause have been greatly exaggerated, and that for the most part the chemicals used in the adulteration have little harmful effect, yet at the same time this line of reasoning does not in any way justify the practice. "No sane person," says that authority, the *Medical Record*, "will be found to assert that the so-called preservatives are beneficial to health; on the contrary, it is certain that they are all harmful in a greater or less degree." The *Fruitgrower* publishes a paragraph from a private letter recently received by a San Francisco house extensively engaged in the export trade:—

We think it advisable to inform you that the (French) Customs officers have just received instructions to have analysed all dried fruit coming from America before allowing it to pass for consumption. It seems that the Ministerial office has received news to the effect that, in the preparation of certain fruit, salicylic acid is employed, which, it appears, is prejudicial to health. A few years back certain kinds of beer which contained this acid were strictly prohibited. In order therefore to transact business in future in France, it will be necessary for you to guarantee that apricots, prunes, or other fruit are entirely free from this acid, for buyers would not care to deal except with firms giving this guarantee.

Salicylic acid is an ortho-hydroxy-benzoic acid—this alone ought to condemn its use—and, instead of being a preservative, it is, and it is used as, an antiseptic and anti-putrefactive agent. This, in the opinion of some people, may be one and the same thing, but there is not only a distinction but a difference. It arrests fermentation, and so the thoughtless or the reckless call it a "preservative." If it were indeed a preservative and only that, there would be no complaint as to its use, but being an arrester of fermentation it hinders digestion, and physical troubles must follow in its wake as surely as night follows day. As stated, its use is indefensible, and the French Government know it, and proposes to do its part in abolishing it; and California fruit curers or handlers who make use of this anti-putrefactive agent, if such there be, may take warning from this article.

Tropical Industries.

RED RICE.

We have not heard that ricegrowers in the North of the colony have met with red rice in their crops. Should they do so, however, they will be glad to learn that although the colour at present injures the sale of the grain, yet the red rice is quite as valuable as an article of food as the white. The *Savannah News* says :—The rice planters and millers of South-west Louisiana are having some trouble with the crop of this season. For some unaccountable reason a considerable percentage of it is red. This is not the first season that grains have appeared among the white, to be sure, but never before has the proportion been so large. An examination by chemists has shown that the red rice is equally as nutritious as the white. The value of the article as a matter of food is not in the least injured by the red grains. But the fact remains that the coloured grains injure the sale of the rice they appear in. There is a movement on foot among the millers looking to the removal of the prejudice against red rice on the part of the consumers, but it may be doubted that it will be attended speedily with gratifying results. It is very hard to remove a prejudice, especially when it has to do with the food one eats.

BAGASSE (OR MEGASS) PAPER.

The *Louisiana Planter* says that the coming sugar season will see the establishment at Baton Rouge of a paper-mill which will use the megass of the diffusion refinery at that place. Mr. Webb, one of the owners of the refinery, is an old paper manufacturer, having spent twelve or fifteen years in that business in Ohio. The sugar-mills already have the power, which is idle ten months in the year, and Mr. Webb intends to devote these ten months to the manufacture of mapping paper. He says a fine grade of "news"—the paper on which newspapers are printed—can be made from the megass. At present the raw material is thrown into the Mississippi River.

In Queensland the megass is usually burnt. It would be interesting to know whether it would pay better to buy firewood for the mills and save the megass for the purpose of paper-making, or to burn it. There would doubtless be an advantage in being able to employ the steam power which lies dormant for so many months on the sugar plantations.

COFFEE REPLACED BY RUBBER.

At the annual general meeting of the Selangor Planters' Association on the 24th February, 1900, Mr. E. N. Carey remarked that they had undergone a most hard and severe struggle during the last two years, and it was most creditable to find that so few had gone under, and they had every reason to be proud that the acreage under coffee had not decreased. The low prices of coffee had induced many planters in Selangor and other States to plant up large areas with Parà and other rubbers, and this promised to be a most profitable investment, as he had reliable information that in the case of a Parà rubber tree in a neighbouring State, which was tapped twice in ten months, half the tree at each tapping had yielded the enormous quantity of 16 lb. of rubber, and the tree in no way harmed. Now the most sanguine of men could not expect such a result all over; but, even supposing they got one-tenth of the above amount, it would mean a fortune.—*Planting Opinion.*

QUEENSLAND ARROWROOT.

WITH reference to the prices of arrowroot in Great Britain, which appear in British price lists as much higher than can be obtained by the growers and manufacturers of Queensland who export the article, we wish to draw attention to the fact that Queensland arrowroot, under the provisions of the Food and Drugs Act, cannot be sold in Great Britain as arrowroot, and this is a matter of great importance to the growers here. The authorities in England, with whom the administration of the Act lies, have decided that the article made here and sent into the English market is not genuine arrowroot, because it is made from the *Canna edulis* and not from *Maranta arundinacea*. Much correspondence has passed on the subject between the Department of Agriculture here and the Acting Agent-General for the colony in England, Mr. Chas. S. Dicken, who particularly interested himself in the matter, and placed himself in communication with Mr. Chamberlain, with the result that arrowroot made in this colony from the *Canna edulis* can be sold in Great Britain only when labelled "Queensland Arrowroot." The Hon. A. J. Thynne, when Minister for Agriculture, advised growers not only so to designate the manufactured article, but to add the words "Prepared from *Canna edulis*." So the matter stands; and when arrowroot is quoted in British price lists, it should be understood that in every case the standard arrowroots of St. Vincent, Natal, and Bermuda are referred to.

Those prices were given in a letter from the Agent-General to the Minister for Agriculture, so far back as 1896, as follows:—

Bermuda	2s. 2d.	per lb.
Natal	6¼d.	„
St. Vincent (1)	2¾d.	„
St. Vincent (2)	1¼d.	„

The Army and Navy Stores supplied samples of five kinds with their prices, viz.:—

Bermuda	2s. 6½d.	per lb.
Bermuda (kind)	1s. 1d.	„
Natal (finest)	9½d.	„
St. Vincent	3½d.	„
St. Vincent (fine)	6½d.	„

The reason for the wide difference in value was the limited supply of Bermuda. There is no sample or price given for Queensland arrowroot for the reasons stated.

"Strictly speaking," says the Assistant Secretary of Inland Revenue, London, in a report on the subject to the Under Secretary of State, "the term 'arrowroot,' without prefix or qualification, should be restricted to the starch derived from plants of the genus *Maranta*, the most important member of which is *Maranta arundinacea*, a native of the West Indies, and which furnishes most of the genuine West Indian arrowroot. The Maranta starch is perfectly distinct in its physical character and properties, and is readily identified under the microscope. A purchaser simply asking for arrowroot would presumably, by use and wont, expect to be supplied with Maranta starch.

Tous-les-mois, or "Queensland arrowroot, the product of the *Canna edulis*, is quite a different starch, and its physical properties and appearance are distinct from those of Maranta starch."

We are informed by Messrs. Lahey Bros. that the price of the Queensland article has varied much in price, sometimes falling to 1¾d. per lb., or £16 per ton, with freight at ¼d. per lb., sometimes reaching as much as 4d. per lb., or over £33 per ton. The average price in Brisbane, the Messrs. Lahey stated to range from £12 to £20, or, say, an average of £15 per ton.

The quotations in the *Journal* for arrowroot are for the three recognised varieties, there being, as we have said, no quotation for Queensland arrowroot available.

Plate CCIV.

STARCHES MAGNIFIED 250 DIAMETERS.

1. West India Arrowroot (*Maranta arundinacea*).
2. Tous-les-mois (*Canna edulis*), Queensland Arrowroot.

SUGAR EXPERIMENT STATION, MACKAY.

REPORT ON CROPS FOR MONTH ENDING 30TH APRIL, 1900.

Name of Crop.	Planted.	Area.	Drilled or Broadcast.	Manure Applied. Name.	Manure Applied. Per Acre.	Rainfall during Month.	Treatment during Month.	Growth during Month.	Date of Harvesting.	Quantity Harvested per Acre.	Total Quantity Harvested.	Remarks.
		Acr's			cwt.					tons		
Sorghum A2	27-9-99	·27	Drilled	Standard phosphate / Potash sulph.	2 / 1	2·205	Cut for horse feed	Seed ripening	...	..	...	Grown for horse feed.
Sorghum A2	28-4-00	·20	,,	None ...	...	...	...	...	...	...	...	
Cow Pea A3	28-9-99	1·23	,,	,, ...	...	...	..	Nil ...	...	...	...	·74 ac. of this been ploughed in. Balance standing will be ploughed in or fed off.
Small Mauritius Bean ... A3	1-11-99	·05	,,	,, ...	...	...	...	Very little	...	...	...	
Velvet Bean A4	1-11-99	1·89	,,	,, ...	...	...	...	,, ...	...	...	...	Coming on since rain fell.
Cow Pea A5	12-1-00	·45	,,	,, ...	...	...	...	...	...	4 vines		This crop was ploughed under, 23-4-00. Very poor crop.
B0 ...		·25	,,	...	...	...	...	...	...	...	...	Fallow.
Small Mauritius Bean ... B1	21-11-99	·59	,,	None ...	...	...	...	Fair ...	...	...	...	
Field Pea B1	21-11-99	·26	,,	,, ...	...	...	...	Nil ...	...	...	...	
Narico Bean B1	21-11-99	·39	,,	,, ...	...	...	...	Very little	...	...	...	
Small Mauritius Bean ... $B2^1$	16-9-99	·08	,,	Standard phosphate / Potash sulph.	2 / 1	...	...	Fair ...	...	...	..	
Velvet Bean ... ... $B2^1$	16-9-99	·38	,,	,, ,, ..	...	...	...	Vines turning sick	...	...	...	Collected small quantity of seed from this.
Black Mauritius Bean ... $B2^1$	16-9-99	·01	,,	,, ,, ...	...	...	...	Fair growth	...	...	...	
Cow Pea ... ... $B2^2$	18-9-99	·39	,,	None ...	...	...	...	Slight ...	...	...	...	Crop to be ploughed in.
Small Mauritius Bean ... $B2^2$	19-9-99	·31	,,	,, ...	...	...	...	Fair ...	...	...	...	
Cow Pea B4	23-2-00	·40	,,	,, ...	..	...	Weeded, scarified	Coming on well now	...	...	...	
Velvet Bean B5	4-11-99	2·24	,,	,, ...	...	...	...	,, ,, ...	...	...	...	
Narico Bean C0 1	22-11-99	·41	,,	,, ...	...	...	...	Nil ...	...	...	...	
Small Mauritius Bean ... C2 3 4	14-11-99	1·36	,,	,, ...	...	...	...	Fair ...	...	...	...	*
Cow Pea ... ... Outside	25-2-00	2·16	,,	,, ...	...	...	Scarified	Died off ...	...	...	...	Killed by dry hot weather and bean aphis
Cow Pea ... ... Outside	25-4-00	·75	,,	,, ...	...	...	...	Up well, 1-5	00	...	...	
Grape Vines ... ... Four rows	,,	...	...	...	...	...	Weed and scarified	...	...	..	...	[ing now.
Thirteen Orange trees	,,	...	...	...	...	...	Weeded	Shooting ...	...	...	...	Scale not quite killed, but trees are grow-
Cane B0	,,	1·10	...	...	...	...	,, ...	Fair growth	...	...	...	
Cane ... ... laboratory	,,	...	...	...	...	...	Weeded & trashed	Good growth	...	...	...	
Pineapples	,,	·20	...	...	...	...	Weeded	,, ,, ...	...	...	...	

* In the March Report should read "Small Mauritius Bean, C2 3 4," and not "Velvet Bean."

REPORT ON EXPERIMENTS FOR MONTH OF APRIL, 1900.

Purpose of Experiment.	Name of Crop Operated upon.	Area.	Planted.	Drilled or Broadcast.	Manure Applied.	Method of Application.	Treatment during Month.	Rainfall during Month.	Growth during Month; with Details of Results of Experiments.
		sq. yds.							
To determine growth, weight per acre, and get analysis of these as green manure crops	Sport Blk. Maur. B.	2	8-3-00	These all planted Broadcast at the rate of 1 bushel in 6 in. tiles, 4 seeds in each	None	...	Weeded and watered once	2·205	Very good vine, covering ground completely.
	Poor Man's Bean...	...	,,						Very good, but foliage not dense.
	Narico Bean ...	...	,,						Good, but ground not covered.
	Small Maurit. B. ...	...	,,						Very good. Ground completely covered.
	Madagascar B. ...	...	,,						Failure, but supplies coming on.
	White's Perennial Cow pea	...	,,						Good growth, covering land.
	Velvet Bean ...	...	,,						Good growth, not yet covered land. Flowering.
	Blk. Cow pea ...	...	,,						Fair. Seed-pods now formed.
For vines, roots, &c., as above	Sport Blk. Maur. B.	...	5-3-00		None	...	Watered regularly	...	Good.
	Poor Man's Bean...	...	,,						,,
	Narico Bean ...	...	,,						,,
	Small Maurit. B. ...	...	,,						,,
	Madagascar B. ...	...	,,						Failure.
	White's Perennial Cow pea	...	,,						Fair.
	Velvet Bean ...	...	,,						Not very good.
	Blk. Cow pea ...	...	,,						Died out, and been replanted 14-4-00.
Various ...	Cane	...	In boxes of sand	...	4 cwt. nitrate potash, 4 cwt. ammon. nitrate, 4 cwt. sodium phosphate, 1 cwt. gypsum	Applied at intervals	Trashed, weeded, and watered at rate of 1 in. per week	...	Good. On 14th April this had 19 canes; total length of cane, 229 in.; average length per cane, 12·1.
	,, ...	...		...	6 cwt. ammon. nitrate, 1 cwt. gypsum		,,	2·205	Good. On 14th April this had 19 canes; total length of cane, 194 in.; average length per cane, 21·6.
	,, ...	...		...	6 cwt. sod. phosphate, 1 cwt. gypsum		,,	...	Good. On 14th April this had 19 canes; total length of cane, 119½ in.; average length per cane, 17·1.
	,, ...	...		...	None		,,	...	Good. On 14th April this had 19 canes; total length of cane, 30½ in.; average length per cane, 5·1.

Seven experiments somewhat similar to above have just been started; three single-eye plants in ach box of sand, one box being a blank. These will be variously manured, and details given next month.

Forestry.

BRIEF NOTES ON SOME TIMBER TREES OF THE BURNETT DISTRICT OF QUEENSLAND.

No. 2.

BY J. W. FAWCETT,
Member of the English Arboricultural Society.

CELASTRINEÆ.

33. *Celastrus bilocularis*, F. v. M.—Australian Staff Tree.

A small spreading scrub tree with ovate oblong, often dentate, leaves, and small flowers in axillary bunches; yields a hard, tough, close-grained, greyish timber—not used.

34. *Elæodendron australe*, Vent.—Blue Ash; Pinkwood.

A slender-growing medium-sized scrub tree, with ovate leaves, very small flowers, and the fruit a bright-red or scarlet globular drupe, yielding a firm, tough, close-grained, beautifully marked pinkish timber, useful for cabinet work, turnery, and tool handles. If cut before it is properly seasoned it is liable to split and warp.

35. *Elæodendron melanocarpum*, F. v. M.

A medium-sized scrub tree, with deep-green oval dentate leaves; small flowers, and black, ovoid, shining fruits; found chiefly in the Mount Perry district; yields a tough, fine-grained, light-coloured timber, useful for axe, pick, and other tool handles.

36. *Siphonodon australe*, Benth.—Ivorywood.

A tall handsome scrub tree, with pale-green foliage, small flowers (August, September), and hard pale-yellow pear-shaped fruits (ripe October to December), yielding a close-grained, firm, easily worked, glossy, yellowish-white timber, useful for cabinet work and engraving.

RHAMNEÆ.

37. *Alphitonia excelsa*, Reisock.—Mountain Ash; Red Ash; Leather-jacket.

A fine large scrub tree, with rough bark and often large ovate or orbicular leaves, green on the upper and whitish on the under sides, small dingy-white flowers (March to June), and the fruit a black drupe (fruit ripe August to October). The timber is durable, hard, tough, firm, and close-grained, the sap or outer wood pinkish, and the heartwood dark-brown in colour. It warps in drying. On account of its hardness, polish, and wear, useful for gunstocks.

SAPINDACEÆ

38. *Cupania anacardioides*, A. Rich.—Native Tamarind.

A slender moderate-sized scrub tree, with pinnate leaves, large greenish flowers, and the fruit a three-lobed leathery capsule; yields a tough, close-grained, pinkish timber, seldom used.

39. *Cupania pseudorhus*, A Rich.

A medium-sized spreading scrub tree, with smooth bark; pinnate leaves shining above and heavy underneath, small flowers, and a dark-brown hairy capsule; yields a beautiful, close-grained, tough, yellowish timber.

40. *Cupania xylocarpa*, A. Cunn.

A medium-sized scrub tree, with pinnate leaves, small flowers, and a woody globular capsule; yields a hard, close-grained, tough, yellowish timber.

41. *Cupania nervosa*, F. v. M.

A moderate-sized scrub tree, with pinnate leaves, small flowers, and smooth globular capsules; yields a strong, tough, close-grained timber with dark-brown heartwood and light-coloured sapwood.

The timbers of all the *Cupanias*, which are seldom used, furnish material which would prove useful for the handles of axes, picks, and other tools.

42. *Ratonia pyriformis*, Benth.

A moderate-sized scrub tree, with large pinnate leaves, small paniculate flowers, and a pear-shaped capsule (ripe November and December); yields a hard, firm, tough, close-grained, light-coloured timber, useful for tool handles.

43. *Ratonia tenax*, Benth.

A small scrub tree, with pale-green pinnate leaves, short paniculate flowers, and flattened pear-shaped capsules; yields a tough, close-grained timber, with light-coloured sapwood and dark heartwood.

44. *Nephelium connatum*, F. v. M.

A small-sized tree, with dense greyish foliage, small paniculate flowers, and a 3-lobed fruit containing black seeds; yields a hard, tough, close-grained, lightish-coloured timber.

45. *Nephelium tomentosum*, F. v. M.

A medium-sized scrub tree, with the young branches covered with a rusty-coloured soft down; pinnate leaves; small flowers, and a soft velvety lobed fruit; yielding a hard, close-grained, yellowish timber.

46. *Harpullia Hillii*, F. v. M.—Walter Hill's Tulipwood.

A moderate-sized scrub tree, with pinnate leaves, small paniculate flowers, and a broad capsule; yields a close-grained light-coloured timber.

47. *Harpullia pendula*, Planch.—Tulipwood.

A fine and often tall scrub tree, with dense light-green foliage, small paniculate drooping flowers (August to November) and orange-coloured capsules (ripe January); yields a handsome, close-grained, strong, tough, beautifully marked timber, capable of taking a fine polish, and valuable for cabinet work and furniture.

48. *Dodonæa triquetra*, Andr.—Hop-bush; Native Hop.

A tall branching shrub, or small forest tree, with long willow-like leaves, small flowers, and hop-like fruits; yields a hard, tough, close-grained, nicely marked timber, with dark heartwood and light-coloured sapwood, useful for tool handles and cabinet work.

49. *Dodonæa viscosa*, Linn.—Hop-bush; Native Hop.

A small forest tree with deciduous bark, angular branches, oblong leaves, small flowers, and hop-like capsules; yielding a hard, close-grained, brownish timber.

ANACARDIACEÆ.

50. *Euroschinus falcatus*, Hook. f.—Maiden's Blush Timber; Jemmy Donnelly.

A fair-sized scrub tree, with glossy green pinnate foliage, small flowers in bloom from November to January, and fleshy drupes; yielding a soft, light, tough, pinkish white timber.

51. *Pleiogynium Solandri*, Engler.—Native Plum; Hog Plum; Sweet Plum; "Noongy."

A moderate-sized scrub tree with spreading head, pinnate leaves; small flowers in bloom from June to August, and rich purple, globose, edible fruit. It yields a hard, close-grained, tough timber of a fine dark-brown with red markings, capable of taking a high polish; useful for cabinet work.

LEGUMINOSÆ.

52. *Jacksonia scoparia*, R. Br.—Broom; Dogwood; "Mamboo."

A tall broom-like shrub or small forest tree, with greyish foliage, small, showy, yellow or orange-coloured flowers in bloom from September to March, and oblong flat pods; yields a hard brownish-yellow timber, which is not much used. It burns with an offensive odour.

53. *Erythrina vespertilio*, Benth.—Coral Tree; Australian Cork Tree; Batswinged Cork Tree.

A medium-sized deciduous forest tree, with the branches covered with prickles; 3-lobed leaflets; pale pink drooping flowers, in bloom October to December, and pods containing reddish seeds (ripe in March). It yields a soft, light, tough, straw-coloured timber, not much used. The aborigines used the timber of this tree for making their shields, and also in the production of fire by friction.

54. *Castanospermum australe*, A. Cunn.—Moreton Bay Chestnut; Bean Tree.

A tall and ornamental tree, with smooth bark, large, pinnate, deep-green, glossy leaves, large yellowish red flowers (November to May), and large oblong brown pods, containing from three to five chestnut-like beans. It yields a hard, handsome, dark, prettily grained timber, which resembles walnut, and useful for cabinet work and furniture. The timber shrinks in drying. The foliage is poisonous, especially if eaten by stock in time of drought. The seeds, after due preparation, are eaten by the aborigines. One of the finest of shade trees.

55. *Acacia penninervis*, Sieb.—Mountain Hickory; Blackwood.

A small tree, with lanceolate sickle-shaped leaves, pale-yellow globular flowers (December to February), and long flat pods. Found on stony ridges; yields a handsome, hard, close-grained, tough, dark-brown timber, useful for cabinet work. The bark is used for tanning purposes.

56. *Acacia salicina*, Lindl.—Willow-leaved Wattle; Native Willow.

A small tree, with often pendulous branches, light-grey foliage, pale globular flowers (December to March), and straight, thick pods. Found on scrubby land; yields a hard but easily worked, tough, close-grained, nicely marked dark-coloured timber.

57. *Acacia podalyriæfolia*, A. Cunn.—Silvery Wattle.

A tall shrub, with silver-grey foliage, small globular flowers, and broad flat pods. Found on stony ridges; yields a nicely marked pinkish timber. The bark is useful for tanning.

58. *Acacia implexa*, Benth.

A small forest tree, with dense foliage, small dense heads of pale-coloured flowers (March to May), and narrow-linear curved and twisted pods. Yields a firm, hard, close-grained, prettily marked greyish timber.

59. *Acacia harpophylla*, F. v. M.—Brigalow.

A tall erect tree, generally forming scrubs by itself, with long curved lanceolate leaves, tapering at both ends, of a deep-green, often pale-grey colour; small globular flowers, and narrow-linear pods. Yields a hard, heavy, elastic, close-grained, dark-brown or reddish timber, having a strong violet-like smell; a useful cabinet wood, but used chiefly for fencing.

60. *Acacia excelsa*, Benth.—Ironwood Wattle; Black Brigalow.

A tall forest wattle, with thick curved oblong leaves, short-stalked globular flowers, and straight flat pods. Yields a very hard, close-grained, finely marked, dark, almost black, timber, with high polishing qualities and a violet-like smell; useful for cabinet work and furniture, but used only for buildings, fencing, &c.

61. *Acacia flavescens*, A Cunn.

A small forest tree, with long sickle-shaped leaves, flowers in globular heads, and curved flat pods. Yields a hard, close-grained, prettily marked, brown timber, useful for cabinet work. The bark contains about 10 per cent. of tannin.

62. *Acacia Cunninghamii*, Hook.—Black Wattle; Bastard Myall; "Deelgar."

A medium-sized forest tree with often reddish branches, long sickle-shaped leaves; yellow flowers in spikes (July to September), and narrow, linear, twisted pods. The best trees are found near the coast. Yields a hard, heavy, close-grained, prettily marked, dark brown timber, capable of taking a good polish, useful for cabinet work.

63. *Acacia leptocarpa*, A. Cunn.

A small forest tree of the coastal district, with long curved leaves, yellow flowers in spikes, and very narrow-linear straight pods. Yields a hard, close-grained, prettily marked dark-brown timber.

GROWTH OF THE LEMON-SCENTED GUM.

THE lemon or, rather, citron-scented gum (*Eucalyptus maculata*) is merely a spotted gum, differing only from the normal form in the citron-like fragrance of its foliage. Its native habitat, according to Mr. F. M. Bailey, Government Botanist, is Gladstone and Rockhampton. It is a fine large handsome tree, but does not succeed in Southern Queensland. Mr. C. Melton, of the *Queenslander* Office, sowed some seed, obtained from Mr. F. M. Bailey, on the Shafton Estate in 1874. In fifteen years it made a diameter growth of 15 inches, and a height growth of over 60 feet. It was grown in shaley soil of a poor quality. In 1890 it was blown over by a gale of wind, and in its fall along a fence carried away nine 9-feet panels. This would make the height of the tree about 80 feet. When the root was examined it was found that the tap-root was completely rotten. Another tree planted at the same time died back when it was 20 feet high. It was topped, then grew again, and finally died off from the same cause—namely, rotten roots. This shows that the tree will not prove a success south of Gladstone, or at least not in the neighbourhood of Brisbane.

FOREST CULTURE.

By GEORGE E. LOYAU.

IT has been rightly remarked that "the glory of a country is in its trees," and certainly to observe the beautiful appearance they present, and how much the charm of the landscape is enhanced by their presence, one can but endorse this opinion. In some parts, however, the Australian forest has been recklessly destroyed; the bushman's axe has sounded far and wide, and an indiscriminate felling of trees taken place, the good and bad meeting with a like fate, whilst none reflected that ere many years had passed, when contracts for sleepers and other large timbers for railway and other public works were in hand, contractors for such would have great difficulty in meeting with the supply necessary to fulfil their engagements, unless at ruinous prices. With suitable areas, and protected, this difficulty at least could be obviated, whilst the proper size and quality of timber would be readily obtained.

It has invariably been found that the denuding of a country of its trees has been followed by sickness and epidemics more or less virulent in character, and instances are on record where persons living in spots which were once healthy suffered serious illness after the timber was cut down and removed. One of the most notable, and probably the best from a medicinal point of view, is the eucalyptus, and it is quite unreasonable to permit this valuable tree to be destroyed; yet, like the other trees in the bush, where its properties are unrecognised, it invariably falls before the bushman's axe when land has to be cleared. In France, its leaves have long been a notable medicine in the pharmacopœia, and used the same as senna and other leaves. Wherever fever

prevails, there the foliage of the eucalyptus has a deterrent effect, the exhalations from these checking the march of malarious vapours.

M. Gimbert, of the French Academy of Science, lecturing before that body, says of the *Eucalyptus globulus*:—It has the extraordinary power of absorbing ten times its weight of water; planted in marshy soil, it dries it in a very short time, and simultaneously emits an antiseptic camphorous effluvia, growing up with astonishing rapidity and attaining gigantic dimensions. At Constantine a large farm was wet and marshy at all seasons of the year. Fourteen thousand eucalyptus trees were planted there, and in five years the land was quite dried and the air perfectly wholesome. A large marsh about a mile off was, by planting eucalyptus, converted into a fine healthy park of 12 acres. In Cuba the tree is regarded as a great boon to that country, where fevers were long prevalent and marsh fevers decimated whole villages and towns. Since the eucalyptus has been planted there all fever has disappeared, and the country has been rendered habitable and healthy. In the Department of Vau, a house near the railway was so unhealthy that the officials could not live in it. Forty trees were planted in a garden in the vicinity, and ere long the evil was obviated and the house occupied.

I mention these remarkable effects to show the value of one of our most common native trees—one destroyed daily instead of being conserved.

In various countries, the ill effects of too extensive cutting of forest timber has been clearly shown. In Upper Egypt, eighty years ago, rain was abundant; but after the destruction of its timber by the Arabs in Lybia and Arabia, rain totally ceased for nine years. As a contrast to this, in Lower Egypt, where rain was almost unknown, extensive tree planting by the Pasha was followed by copious and frequent rainfalls. At the Cape de Verde Islands, on the forests being destroyed, no rain fell from 1830 to 1835, and 30,000 of the inhabitants perished from severe drought.

In 1848, M. Carron, a botanist of no mean eminence, visited Queensland, under instructions from the New South Wales Government (this colony then being part of their territory), to select suitable spots on the Northern rivers for reserves. Having accomplished his mission, he returned to Sydney, but a few years afterwards he revisited the spot on which the reserves had been proclaimed. He there found that no steps had been taken by the new Queensland Government to protect their interests, and that few of the best trees were left standing. Indiscriminate slaughter of timber had taken place by bushmen and others who selected what timber they chose, and wherever it was more easily procured. He also reported that one person had built a stable, but, instead of taking a few large trees and splitting slabs, had formed it of saplings, using about 100 of these for the purpose, whilst to roof it in he took one sheet of bark from an equal number of other full-grown trees, leaving them to die with five-sixths of their bark on them, within sight of a main road in a growing district where good timber will eventually be required for bridges and other heavy work.

So glaring did this waste of timber by the early settlers become that our first Parliament passed an enactment to try to check the evil, which, however, still continues. Rangers of large experience should have control over the the forest reserves, which should be regarded as nurseries, from which other newer-formed reserves could be supplied. In each of the colonies attempts are still made to check the waste of valuable timber, and in New South Wales, all too late to prevent the denuding of large tracts of country by ringbarking. A more unsightly aspect was never presented in any country in the world than that which greets the eye of the traveller by the overland railway line from Melbourne to Sydney and thence northward to Wallangarra on the Queensland border In Victoria, at the time when gold-mining was in the ascendant, the value of timber used for mining purposes was £480,000, and since 1852 the exports of timber to Victoria for building purposes totalled a value of £10,000,000. These figures, if considered, will do more to convince those sceptical on these facts than tons of argument, however ably expressed.

In New Zealand a State Forest Bill has been passed, which provides not only for the preservation of existing trees from destruction, but requires the planting of others in place of those removed in course of trade. In South Australia a movement of this kind was begun by the late Mr. Ednie Brown, Conservator of Forests, but since his departure the reserves apportioned out have been greatly neglected, and are now partly destroyed.

The subject of forest conservation is one which comes home to Queensland, and at no time has this been so palpable than at present, when a State Forest Bill is an actual necessity. If the indiscriminate cutting of timber and slaughter of young trees is permitted to continue as heretofore, the supply of timber for railway lines, bridge buildings, culverts, &c., will be both small and dear, since, instead of being easily procured along the surveyed railway route, it will have to be purchased, or else drawn from long distances at great cost.

It may not be out of place to mention that the passing of an enactment of this sort by the first Parliament served to keep in check many bushmen and splitters who had hitherto cut down the bunya-trees in the scrub called by their name. These trees—the Australian breadfruit—are now tabooed ; and the aborigines, to whom they are a grant from the Crown, guard them zealously, and prevent depredations which would otherwise take place.

[This matter of forest conservation, we are glad to say, has now been taken in hand by the Government, and, as a preliminary, an Inspector of Forests has been appointed.—Ed. *Q.A.J.*]

WATER-LOVING TREES.

It is unanimously agreed that the Moreton Bay fig-trees form a fine shade, and in the adjacent colonies they are now in great request for planting as ornaments in some of the leading thoroughfares of country towns. In America, most towns and cities are beautified by similar arborescent treasures, which form a grateful shade from summer heat. *Apropos* of the Moreton Bay fig, it is stated that these trees will extend their roots for a long way in the direction of water, which they absorb largely ; and an instance is on record of the roots of one travelling several yards into a well which had been unused for some time. When the owner went to draw water from it he found it so choked with roots that they were obliged to be cut away ere the bucket could be lowered to procure the fluid below them If these trees were planted on marshy and swampy spots, they would soon absorb the moisture and render them perfectly sanitary.

THE AFFORESTATION OF NATAL.

Mr. G. H. Davies, Forest Ranger, Qudeni, writes as follows in the *Agricultural Journal*, Natal :—In the *Journal* of the 19th January there appeared extracts from a paper read by Mr. D. E. Hutchins before the Society of Arts, London. The subject, "National Forestry," implied a State undertaking upon a large scale rather than that combined action on the part of landowners always kept in view in the papers dealing with forestry in the *Journal*, and which is necessarily the only course open to us in Natal. It is as well, however, to keep in mind the reasons why State forestry is superior to private efforts to plant woods and to maintain them afterwards. The State, duly empowered in a colony which has alienated most of its soil, can afforest areas large enough to be of climatic importance to the country generally ; and the State can protect the forests with the arm of the law. It has, however, been pointed out by Mr. Hutchins that it is in the finance of the matter that the State chiefly scores, and in this Natal has an immense advantage over Britain. If the following suggestions are anything to the point, land which is represented by so great a portion of the capital required for the afforestation of the old country need not cost the colony a

penny. The Crown forests cannot be enlarged—though there is room for much planting within their boundaries—but the undemarcated bushes can be reserved upon a more liberal scale as to the surrounding lands—which are suitable only for summer grazing, and might be leased as pasturage for the benefit of the forests, until they can be planted. Crown forests, however, only concern us in so far as the cost of their conservation increases the general cost of any scheme for the afforestation of the colony. This cost will have to be borne by the owners of the land benefited, and as the State owns but a small portion of the land it can only be burdened with a proportionate share of the expense. The landowner in a settled district could do a great deal of afforestation on his estate, at a very low cost, with the surplus labour and appliances, perforce allowed as a margin to the resources available for his regular work. As the land to be wooded is land that can be made productive in no other way, it is rather surprising that the owner does not cover it with trees; but he knows well enough that a patch of trees is neither "here nor there," and that appearances are more cheaply obtained by clumps, screens, and hollow belts of foliage. It is hardly worth while planting areas of solid woodlands that are too small to sensibly affect an estate climatically, even if they are allowed to reach the age at which their consumption of water is balanced by their conservation of it Some guarantee that the afforestation of the otherwise useless portion of an estate shall be both a permanent and an effective improvement is required; and to be climatically effective it is necessary that the other estates in the neighbourhood should be similarly afforested, so as to present such an area of solid woodland as will ameliorate the droughts, seasonable and unseasonable, to which every part of Natal is liable. This guarantee is therefore the crux of the whole problem; and if it can be given, the landowners of the colony, knowing that their work will be good for all time, may be left to turn their barren hillsides into forest, profitable directly to themselves, and indirectly to the country at large. Such a guarantee can be given by a forest law, locally optional, but which, when once applied to a district, cannot be removed without special legislation, difficult to obtain, and practically impossible, except in the case of land required for a public purpose. This is a point vital to the success of such a scheme; but it will be of course understood that the owner only relinquishes his right to disforest in order to increase the value of his estate, and that he retains full rights of sale and disposal as before. Crown forests would be under the law from the first, and local option might perhaps be also refused in the case of important areas of indigenous bush (subject to compensation of some kind) now in private hands.

As a suggestion, the law might work as follows: A certain minimum acreage of land lies along a ridge of hills through several adjoining properties, which is suitable only for afforestation. The owners consent to place this area under the forest law, and it becomes a forest district within the meaning of the Act, while the owners themselves (or a committee elected by them) form a local conservancy board for its administration, empowered to fix the area to be planted annually, and the contributory work or subscription of each shareholder. The Government appoints an officer to be in independent control of both the planting and felling, who shall select the actual site of the former and mark the stems for the latter purpose—it being obvious that each landholder will prefer that his own property has prior attention, though the forest should be considered as a whole, and that the authority selecting the trees to be felled should have no interest in the resulting timber. The conservators should, however, appoint and control the forest guards, and be responsible for the observance of the regulations under the law; the Crown forest officer only visiting the forest to inspect or mark cuttings. The Government would, therefore, be free from the expense of special supervision; but it would be necessary to provide against the danger that slackness of local interest might afterwards compromise the success of local effort. Some clause in the law might empower the Government to take over the full control of a district forest at any time, and to deduct the cost of management from the revenue before paying over the latter to the shareholders. Given a regular

supply of well-grown timber—not to be obtained from the despoiled wild bush—this revenue must become a large one, and it is not too much to say that the share in a forest of an estate will form an important part of the owners' income. Exotics will doubtless be much planted, but it is to be hoped that our fine native conifer, the yellowwood, will be given, what it has never yet had, a fair trial. Occasionally well-grown specimens of this tree are met with in wild bush, showing by their straight, well-shaped stems, what could be done by proper use of the marking-hammer to give the right amount of air and light that happy accident has given in their case. If, under such a forest law as is here proposed, the Government gave facilities to the conservators for taking plants from the Crown forests, the latter would become nurseries for the afforestation of the colony. In the Crown forests open to wood-cutters, foresters competent to select trees for felling must perforce be employed, and they might well also plant out seedlings for removal. The Crown forests can supply, without injury, an unlimited number of plants.

Should a forest law of the kind suggested be promulgated, it would necessarily come very slowly into operation at the first. A pioneer district or two would make a start, and the test thus applied might reveal weak points to be corrected; but, as a formerly treeless district began to be clothed with young woods, the mere addition in beauty would inspire emulation. The value of land would rise in a forest district almost from the start, and increase with the age and area of the forest. Before the first decade was reached the pole thinnings would have commenced a revenue—without counting the wattles sold before this to the natives. The young trees or large pole-stage would more than repay the total cost of planting, and the timber itself would be clear profit. The problem presented by afforestation differs from that presented by wild bush, in that everything can be planned with certainty—the roads, approaches, working spaces, may be laid down while the land is bare—and the trees can be set out at equal intervals so as to ensure from the first the best return. Forest land—that is neither arable nor good pasture—usually runs together along the ridges of hills, and thus, as contiguous districts gave in their adhesion to the scheme, unbroken forests would extend for miles over the now dreary barren undulations of the colony. Villages and town corporations might find the absolute protection given by a forest law desirable in the case of the water-sheds of their supplying streams, and for plantations upon areas that should never be alienated. The Government itself would find its hand strengthened sufficiently for the improvement and reopening of the larger of the natural forests, now under the management of police—who are only competent to close them altogether. Natal, now a raw conglomeration of naked ridges, with torrents for streams, and shrubby ravines for forests, would gradually become a clothed country watered by gently flowing brooks, showing everywhere the beauty now hidden in remote dells, arable where now is but pasture, and pastoral where now moisture will not stay long enough to maintain good grass; while, in addition, she would possess, in countless acres of timber, a source of wealth that must always grow in value because fresh uses are ever being found for it.

In conclusion, a forest law can empower the whole community, through its Government, to guarantee the permanence of afforestation work by decreeing that no forest placed under that law shall ever be abandoned; and by taking out of the hands of those temporarily interested the power to destroy the forest for a temporary increase of revenue. The details of such legislation—the precise limitations of central and local authority—might well be discussed in the Press as soon as landowners and others form an opinion favourable to the principle of a forest law. Before such an opinion can become general the idea itself must be published; hence the suggestion of it in this paper. The work before us is immense, and progress with it must be all the slower as time will have to take the place of money in the poorer districts—that is, the annual acreage afforested will be, in many places, small. The sooner, therefore, that machinery to do the work is put in motion the better.

Science.

THE EFFECT OF INCANDESCENT LIGHT ON PLANT GROWTH.

Experiments have been made at West Virginia Agricultural Experiment Station, to test the effect of a continuous application of light to certain plants, by Professor L. C. Corbett. The daylight was supplemented at night by the incandescent light of the Welsbach burner, and the light was shown to be an active stimulus to plant growth when so used. The further teachings of the test are:—

1. Lettuce plants subjected to the influence of the incandescent gas light at night were taller and heavier than plants of the same variety and seed sowing grown in normal conditions.

2. That lettuce and spinach subjected to the stimulating influence of the light grew faster and completed their growth in less time than plants of the same sorts from the same seed sowing grown in normal conditions.

3. That no injurious effects resulted from the use of the incandescent gas light.

4. That the stimulating influence of the light, as indicated by the growth of plants used in the various tests, is shown by the order in which the sorts are named, the first being the most susceptible—spinach, cabbage, radish, lettuce, tomato.

5. That the range of the light is somewhat variable for the different crops. In general, the maximum growth was attained at 12 to 16 feet from the light, while a perceptible increase was noticed at 24 feet.

6. Bloom record of tomatoes shows markedly earlier bloom in the light house—eight days the least and eighteen days the greatest difference.

7. That in the case of radishes top growth was stimulated, but evidently not markedly, at the expense of root. With sugar beets top growth was greatly stimulated evidently at the expense of root growth.

8. That while the roots of beets grown in the normal house were larger than those in the light house, the sugar contents and the per cent. purity was markedly higher in the lighthouse grown roots.

9. Spinach, lettuce, and radishes all tend to make seed stalks earlier under the light than in normal conditions.

10. Lettuce and spinach under the influence of the incandescent gas light not only grew faster during the growing period, but the period was actually longer than for plants in the normal house.

THE EFFECT OF SCIENTIFIC INVESTIGATION UPON AGRICULTURE.

The *art* of agriculture is as old as man, but the *science* of agriculture has not yet completed its first century. It seems at first thought impossible to believe that, before the nineteenth century dawned, agricultural science was, to even the most advanced scientific workers and explorers, a—"dark continent." In 1804, De Saussure published a work entitled, "Recherches sur la Vegetation," in which he gave the analysis of the ashes of many plants, and contended that they were absolutely essential to the growth of the plant, that they must be derived from the soil, and that probably these ash or mineral constituents that the plant derived from the soil were the source of those found in the animals which fed upon the plants. From 1802 to 1812 Sir Humphrey Davy delivered several series of lectures, which he published in 1813, under the title "Elements of Agricultural Chemistry." To him is due the credit of making

the first attempt to reduce agricultural knowledge and investigation to a scientific basis. The work of these two men, together with that of Thaer, Sprengel, and Boussingault, prepared the way for the magnificent work of Liebig, whose publications appeared in 1840 and 1842, since which time many of the brightest minds in Europe and America have been investigating the composition of the soil, plant, and animal, and their relation to one another.

Davy said: "Discoveries made in the cultivation of the earth are not merely for the time and country in which they are developed, but they may be considered as extending to future ages, and as ultimately tending to benefit the whole race, as affording subsistence for generations to come; as multiplying life; and not only multiplying life, but likewise providing for its enjoyment."

Liebig, in one of his productions, wrote: "I shall be happy if I succeed in attracting the attention of men of science to subjects which so well merit to engage their talents and energies. Perfect agriculture is the true foundation of trade and industry—it is the foundation of the riches of States."

Chemistry was the first science that came to the assistance of agriculture, and ever since agricultural science has been largely built upon agricultural chemistry as a foundation.

Its application in connection with soils and fertilisers, foods and feeding, and with dairying is readily comprehended. A large portion of the work in other sciences could not be carried on without the assistance of the agricultural chemist. Perhaps one illustration of the value of chemistry may be sufficient for our present purpose. The beet sugar product in Germany has increased from 360,000 tons in 1876 to 1,620,000 tons in 1896. The average product of beet roots is about 10 tons to the acre. In 1876 the 10 tons produced less than 2,000 lb. of sugar, whereas in 1896 the same weight produced 3,000 lb.; in other words, the beet-root of to-day contains over 50 per cent. more sugar than it did twenty years ago. To the agricultural chemist belongs the large proportion of the credit for this marked improvement.

Botanists are at work studying the plants of the world, and helping in the production of new varieties and the improvement of old varieties. Let me give you but one example of the value of this. About 6,500,000 acres in Ontario are devoted to grain-growing. If by selection and cross fertilising we could obtain seed grain that would add only one bushel per acre to the crops, the annual grain product would be increased by 6,500,000 bushels. The grain crops of Ontario in 1897 were worth over $50,000,000. An improvement to the extent of 25 per cent. is quite within the range of possibility. The President of the Agricultural College, in his report for 1897, referring to this work in improving varieties of grain, says:—"In this way some excellent foreign varieties have been introduced, tested, and distributed throughout the province—varieties which yield from 6 to 8 bushels per acre more than any varieties previously grown. In oats and barley alone, the varieties introduced and distributed by the experiment stations have, within the past four or five years, paid to the province a good deal more than the entire cost of the college for the last ten years"

Entomologists are studying the thousand-and-one insects and diseases affecting our grains and fruits. One practical example will perhaps best illustrate the value of Entomology. About ten years ago the complete destruction of the orange groves of California was threatened by the spread of an insect known as the "cottony-cushion scale." The vitality was being sucked out of the trees by millions of tiny insects that literally covered them. The pests got completely beyond the control of the fruitgrowers of that country, and in their despair they appealed for help to somebody or anybody. Professor Riley, who was in charge of the Entomological Department at Washington, and who unfortunately met his death in 1895—one of the greatest benefactors the American people has ever known—at once began the investigations of that question. Being an expert entomologist, he knew practically every country in the world where that scale insect was common, and he knew that the place from which it had most likely

come was Australia. It had probably been introduced, some twenty years before that, in bringing fruit trees or vines. He, however, knew it had never become a pest in Australia. Now if it is found in Australia and later found in California and had not become a pest in Australia, he concluded there must be something in Australia that will stop it, so he despatched two assistants to Australia to investigate it, and they sent back consignments of lady-bug beetles or lady-bugs as they are commonly known. You have seen these running back and forth over the leaves and branches of the fruit trees, doing great destruction to the other insects. Within a very short time, less than a year, although these scale insects had been increasing for twenty years, and practically had the product of California by the throat, and, in fact, had taken possession of the country; in less than a year, this little lady-bug had increased to such numbers that it swept the scales out of existence, or got it into such control, that the fruit interests of California were saved. I do not suppose that anybody could sit down and readily figure up the amount of money that was saved or made for the United States by that simple little insect brought in by a man known to very few present. You do not see his name prominent in the newspapers. The fact was not heralded broadcast in great flaming type. He was not given any great ovation. It is a question whether any monument will be erected to him by the United States, yet it is doubtful whether the United States has had any greater benefactor than that man and his associates. The importance of economic entomology to the farmer is thus referred to by the late Professor Panton, of our Agricultural College, in an article contributed to the Farmers' Institute report for 1896-7:—

"The study of insects in relation to man has of late years commanded much attention, and is usually referred to as economic entomology. While there are some insects beneficial to man, there are many injurious. Some destroy his food, some injure his clothing, and others attack the animals that are of use to him. Nearly 100 species have been found preying upon his grain and forage crops; upwards of 40 upon his vegetables; 50 upon the grape; 75 upon the apple. The pine has 125 species as enemies; the oak, 300; the elm, 80; the hickory, 170; the maple, 75; the beech, 150; while the unfortunate willow battles against 400 insect foes. The following statistics show what an immense loss is sustained by man from insects:—

1854—The United States lost $15,000,000 by the wheat midge.
1857—Canada lost $8,000,000 by the wheat midge.
1864—The United States lost $75,000,000 by the chinch-bug.
1870—New York State lost $5,000,000 by the cabbage worm.
1873—The Southern States lost $25,000,000 by the cotton worm.
1874—The United States lost $356,000,000 by the grasshopper.
1884—Canada lost $500,000 by the clover midge.

"The average loss of the United States from insects during 1884 is calculated to have been $400,000,000, and for 1891 $300,000,000. With such figures before us, in most cases under the mark, we must conclude that the study of a subject that will enable us to lessen this loss is of great importance."

The biologist is studying the microscopic forms of life that produce plant food in the soil, that bring about the changes in stored foods, that control the fermentation in milk, butter, and cheese, and that cause the many diseases in our live stock. The debt that the whole world owes to the great Pasteur should not be forgotten. He established the principles of winemaking, and saved the vineyards of France; he laid the foundations for dairy bacteriology; he mastered anthrax, the terrible disease that threatened the annihilation of the herds, not of France alone, but of all Europe as well. He was one of the greatest geniuses that the world has ever known, and agricultural science received a wonderful impetus from the labour of his head and hands and heart.

So important is scientific research in connection with agriculture that one noble-minded Englishman set apart a great estate in England for that work,

and endowed it with £100,000. For about half-a-century the work has been carried on at Rothamsted, and the Queen has recognised it by knighting its donor and assistants. Sir John Bennett Laws and Sir Joseph Gilbert are familiar names in the higher agriculture of the whole world.

One of the hopeful signs of the times is that agricultural scientific investigation is attracting more and more attention on the part of our Governments, young men of promise are being drawn into its ranks, splendid opportunities for research are being provided in many countries, and we may confidently look forward to a great advancement in the next quarter of a century. The probable effect upon agricultural life of the application of scientific investigations and discoveries may well attract your careful attention.—*From Appendix, Ontario Bureau of Industries.*

MEASURING STACKS.

WE have already given several formulæ for measuring the quantity of wheat or hay contained in round, square, and oblong stacks. There is yet another, which we take from the *Farmer and Stockbreeder*, and which is given in answer to a correspondent:—

The volume is equal to—

$\frac{1}{3}$ × area of the base × height.

For example, we will take the stack A B C D E. Its volume consists of two parts:—

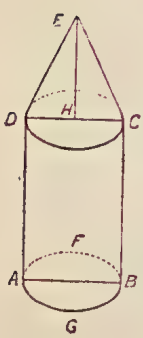
1. The cylinder, A B C D, and
2. The top or cone, D E C.

Now the volume of the cylinder is found by doing what the querist has done—viz., multiplying the area of the circle A G B F by the height A D. The area of the circle can be found in four ways, but the one stated is the simplest—viz., square the circumference and then multiply by ·08. But then we must add the volume of the cone D E C. We will take an easy example—viz., a stack whose circumference is 30 feet, height 20 feet, and height of top 6 feet. Its volume will be—

$$\text{Cylinder} = 30^2 \times \cdot08 \times 20 = 1{,}440 \text{ cubic feet}$$

$$\text{Top or cone} = \frac{30^2 \times \cdot08 \times 6}{3} = 144 \text{ cubic feet}$$

$$\text{Total} = 1{,}584 \text{ cubic feet}$$



This must, of course, be divided by 27 to bring it to cubic yards. Thus, in this instance, there will be 10 per cent. bigger volume than by mere measurement of the cylinder alone. I hope the querist will be able to convince the next hay-buyer who comes his way of its absolute accuracy. Of course, if the circumference of the stack varies at different heights, the mean circumference should be taken.

In regard to the weight of cubic yards of hay, the differences are great, and vary not only with the age of the stack, but also with the size and the position in the stack. A yard of hay at the top will weigh less than a yard at the bottom, and a yard in a stack of 500 cubic yards will weigh much more than in a stack of 50 yards. Sometimes in new small stacks a cubic yard may not weigh more than 9 stone, whereas towards the bottom of a big old stack it may weigh 20 stone. Why not cut a cubic yard out and weigh it?

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1899.										1900.		
	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
North.													
Bowen	8·61	9·16	1·46	Nil	0·63	0·21	0·06	0·56	Nil	2·92	7·61	0·40	
Cairns	35·46	12·97	4·03	0·63	2·01	1·31	3·23	0·74	0·33	4·57	43·06	1·98	8·90
Geraldton	41·28	40·65	12·61	1·64	8·93	2·85	9·03	1·03	Nil	4·89	62·26	2·36	8·86
Herberton	21·32	6·74	1·49	0·66	0·23	0·36	1·62	0·18	2·75	0·73	11·90	0·23	1·97
Hughenden	2·99	0·10	0·01	0·20	0·46	2·05	Nil	0·45	1·05	0·33	6·42	1·04	0·01
Kamerunga	...	...	...	...	...	...	...	...	...	...	...	1·01	8·60
Longreach	4·05	0·54	0·58	0·60	1·08	0·28	0·06	0·27	0·67	Nil	1·68	0·48	Nil.
Lucinda	20·05	14·60	1·71	0·40	2·78	0·80	0·97	0·02	1·26	1·02	37·35	1·71	No ret
Mackay	18·65	9·19	4·74	Nil	2·29	2·37	1·33	0·19	0·49	7·65	20·86	0·65	4·12
Rockhampton ...	3·59	4·42	2·49	0·40	2·23	1·71	1·96	2·35	1·22	11·02	4·53	0·25	1·64
Townsville	10·93	3·76	0·59	Nil	0·78	0·89	0·01	0·35	0·16	0·53	21·09	0·07	1·68
South.													
Barcaldine	2·33	1·17	0·39	0·05	1·03	0·53	0·27	0·94	0·52	0·04	3·08	0·65	0·09
Beenleigh	0·76	4·26	3·06	5·70	6·95	2·02	3·11	2·53	1·80	7·40	5·42	3·19	2·22
Biggenden	...	...	...	...	...	...	...	...	...	...	...	0·40	2·81
Blackall	2·74	0·18	0·13	0·20	1·11	0·57	0·16	1·20	0·04	0·85	1·73	1·31	0·63
Brisbane	0·71	3·32	1·54	2·75	3·50	1·43	2·48	2·26	2·33	7·61	6·51	5·18	...
Bundaberg	3·76	4·13	2·92	1·42	2·33	2·62	1·67	1·60	0·06	7·62	4·63	0·86	1·86
Caboolture	1·40	3·85	2·06	2·67	4·61	1·90	2·40	2·30	2·23	7·44	3·04	4·18	5·66
Charleville	0·51	0·52	0·06	0·25	0·34	1·26	0·55	0·36	0·43	0·16	1·01	0·08	0·79
Dalby	0·57	2·79	1·20	1·33	1·67	1·09	1·20	1·44	1·84	2·89	0·41	6·31	2·80
Emerald	3·00	2·60	2·43	0·03	1·31	2·08	1·96	1·93	1·32	0·40	3·08	1·22	3·97
Esk	0·94	4·11	1·89	2·40	2·59	1·69	2·79	2·67	2·25	5·34	1·42	2·34	4·73
Gatton College ...	0·21	3·32	1·33	1·18	2·01	1·55	2·19	2·13	3·50	5·87	2·40	4·07	3·13
Gayndah	1·01	1·45	1·26	1·30	0·86	3·34	1·24	2·73	4·59	7·37	2·52	2·07	1·11
Gindie	...	...	...	...	...	...	...	...	...	...	...	0·57	1·04
Gympie	2·88	4·01	2·89	3·57	2·26	1·23	2·11	2·41	0·39	6·44	5·59	1·84	2·76
Ipswich	0·24	4·11	1·41	1·82	2·42	1·29	2·77	2·04	3·46	4·66	2·79	1·66	1·85
Laidley	0·51	3·66	1·63	1·32	2·00	1·82	5·04	3·17	2·40	6·50	0·64	3·15	2·87
Lucinda Point ...	...	...	...	...	...	...	...	...	...	...	...	...	4·90
Maryborough	5·91	4·59	3·35	4·20	1·71	1·49	2·29	1·20	0·51	4·13	4·88	1·78	3·26
Nambour	6·87	5·32	3·79	6·17	4·18	1·81	3·13	2·87	3·03	11·11	4·07	5·64	4·67
Nerang	1·92	5·36	2·28	3·34	9·80	2·52	4·74	1·99	1·42	6·31	4·60	3·37	3·06
Roma	0·63	1·70	0·26	0·53	1·05	1·00	0·55	0·35	1·27	0·99	0·43	1·52	4·40
Stanthorpe	0·43	2·53	1·20	1·36	3·11	1·08	1·63	1·36	0·86	3·22	2·62	4·81	1·87
Taroom	2·89	3·52	1·35	0·61	1·27	1·60	1·55	0·83	3·32	0·65	1·78	3·65	2·92
Tambo	1·52	0·52	0·15	0·60	1·16	0·74	0·27	0·79	0·08	0·66	2·28	1·55	0·30
Tewantin	7·36	8·66	6·87	9·28	5·00	3·67	2·80	3·36	0·46	8·22	1·69	4·87	5·36
Texas	0·13	2·37	0·50	3·26	2·95	1·38	1·72	0·97	0·74	2·67	1·56	3·39	1·63
Toowoomba	0·80	3·68	1·33	2·11	1·75	1·63	3·15	1·43	2·36	4·75	1·01	2·90	2·87
Warwick	1·16	4·13	1·03	1·53	2·44	1·00	1·99	2·48	1·67	3·83	1·84	4·19	1·93
Westbrook	...	...	...	...	...	...	...	...	...	...	...	3·71	1·78

QUEENSLAND PRODUCTS IN BRITISH MARKETS.

LATEST WHOLESALE PRICES.

BUTTER.—Choicest Australian, 90s. to 92s.; choicest New Zealand, 92s. to 94s.; the market for choicest butter is expected to remain firm—of inferior, there is more than enough; finest of both kinds, 86s. to 88s.; choicest Danish, 106s. to 108s. per cwt.; finest, 102s. to 104s.

CHEESE.—New Zealand choicest, 60s. to 61s. per cwt.; American, 60s. to 61s.; Canadian, 61s. to 62s. Prices will inevitably advance owing to short supplies and increased consumption. Queensland cheese sold at from 40s. to 44s. per cwt. Coloured cheese remains as firm as ever, 94s. having been made for it on 6th April.

SUGAR.—Sugar continues to advance. The Colonial Sugar Refinery Company notified a further advance in May of 20s. per ton, making quotations :— Tablets in 56 lb. cases, £25 per ton; brewers' crystals, £18; No. IX., £17 10s.; No. 1A, £17 10s.; No. 2, £16; No. 3, £15; Java, £9 15s. to £10 10s. per ton; German beet, 88 per cent., 9s. 9d. per cwt.

SYRUPS.—4s. 9d. to 11s. per cwt.

MOLASSES.—5s. to 6s. per cwt.; Queensland, none.

RICE.—Patna, 20s. to 24s.; Java, 21s. to 26s. per cwt.

COFFEE.—Finest Coorg peaberry, 130s. per cwt.; Ceylon plantation, 116s. per cwt.; bold blue, 124s.; Santos, 58s.; Long berry Mocha, 102s.

ARROWROOT.—Natal, 6½d., St. Vincent, 7½d. per lb., all duty paid; Bermuda, 1s. 9d. to 2s. per lb.

WHEAT.—Australian, 29s. 6d. per quarter; about 3s. 7d. per bushel. American, 30s. to 31s. 6d. per quarter; German, 34s. to 35s. per quarter.

NEW ZEALAND OATS.—22s. to 26s. per 384 lb.

GINGER.—Calicut, rough, 22s. to 23s. per cwt.; medium new crop, 70s. to 90s. Jamaica: Ordinary, £3 10s.

PEPPER.—Long red chillies, 56s. to 75s. per cwt.

TOBACCO.—Prices for pipe tobacco on 1st April, 1900—Pipe tobacco :— Kentucky Leaf: Common to fair, 3d. to 5½d.; coloury, good to fine, 7½d. to 9½d. Kentucky Strips: Common to good, 3½d. to 7½d.; fine, 8d. to 11d. Virginia Leaf: Common to fair, 3d. to 6d.; coloury, good to fine, 8d. to 13½d. Virginia Strips: Common to good, 4d. to 8d.; fine, 8d. to 12½d. Cigar—Sumatra, 7d. to 5s.; Manila, 3d. to 4s.; Havana, 8d. to 5s.

WINE.—Fair red wine (Australian claret type) in bond, 2s. to 2s. 6d. per gallon; fine old quality, 4s. 6d. per gallon; ordinary London port, £10 per pipe of 110 gallons; Marsala, £12 per pipe of 96 gallons.

GREEN FRUIT.—Apples: South Australian New Yorks, 22s. to 26s.; Tasmanian, 11s. to 12s. 6d; New Yorks, 18s. 6d. to 21s.; Victorian, 11s. to 13s. 6d. per case. Pears, 8s. to 12s. per case. Pineapples, 2s. 6d. to 6s. each. Oranges: 10s. to 13s.; selected, 22s. to 32s.; others, 9s. 6d. to 11s. per 420. Grapes: Australian, 2s. to 8s. per case, fruit inferior; Almeria, 20s. per barrel. Bananas: 10s. to 14s. per bunch. Shipments of Tasmanian apples per "India" and "Salamis" on 10th May brought 6s. to 11s. per case, the fruit being overripe and heated. Victorian and South Australian, 5s. to 15s. A few good parcels realised from 16s. to 18s. per case. Previous high prices are not likely to be maintained.

EGGS.—Australian, none offered; Irish, 11s. to 12s. per 120; Danish, 6s. 9d. to 8s. 3d. per 120; French, 8s. to 8s. 6d.

HONEY.—British, 45s. per cwt.; colonial, no quotation.

Olive Oil.—£33 to £36 10s. per tun (252 gallons). Eating Oil, 50s. to 65s. Linseed Oil, 3s. per gallon.

Sisal Hemp.—£18 to £30 per ton.

Wool.—The May series of London wool sales opened on the 8th ultimo. Best sorts experienced a fall of 10 per cent. as compared with prices at the March sales. Medium and inferior wools were 5 to 8 per cent. lower. Later advices state that the market is firmer.

Frozen Meat.—The latest quotations to the 12th May for the various descriptions of frozen meat are:—New Zealand mutton (crossbred wethers and maiden ewes): Canterbury, 4⅜d.; Dunedin and Southland, 4¼d.; North Island, 4 1/16d. Australian mutton (crossbred and merino wethers): Heavy (over 50 lb.), 3¾d.; light (under 50 lb.), 3⅞d. River Plate mutton (crossbred and merino wethers): Heavy, 4d.; light, 4d. New Zealand lambs: Prime Canterbury (32 lb. to 42 lb.), 5¼d.; fair average, 5d. Australian lambs: No quotation. Australian frozen beef: Fair average quality ox forequarters (160 lb. to 200 lb.), 2⅝d.; hindquarters, 3¼d. New Zealand frozen beef: Fair average quality ox forequarters (160 lb. to 200 lb.), 2⅞d.; hindquarters (180 lb. to 220 lb.), 3½d. The above prices are the official quotations furnished by the Frozen Meat Trade Association. The basis of quotations is sales of lines of not less than 100 carcasses of mutton or lamb, or 25 quarters of beef. All the quotations for mutton are for average quality. Quotations for New Zealand and Australian lambs do not include sales of small lambs, or heavies, or inferior quality.

Bacon.—59s. to 60s. per cwt. for lean sizeable; fat stout, 55s. to 57s. per cwt.

Hams.—Canadian, 40s. to 50s. per cwt. Irish (smoked): Special brands, 76s. to 84s.; fine, 74s. to 86s.

Hides.—Queensland bullock, heavy (52⅝ lb.), 5⅞d. to 6d. per lb. Messrs. Dalgety and Co. report that Queensland and New South Wales hides, ordinary quality, were virtually unsaleable on 14th May, except at lower prices.

Skins.—Sheep: Fine Tasmanian, 11¾d. per lb.; Melbourne, 11¼d. per lb.; Adelaide, 10¾d. per lb.; short and shorn, 4½d. to 8½d. per lb.

Furred Skins.—*Kangaroo*, 1s. to 1s. 4d. per lb. *Opossum*, 5d. to 1s. 1¾d.; Tasmanian, 3s. 6d. to 6s. 9d. per dozen. *Wallaroo*, 1s. 9d. per lb. *Wallaby*, 1s. 3d. to 1s. 8d. per lb. *Bear*, 2s. to 9s. 6d. per dozen.

Tallow.—On 10th May, mutton tallow, fine, brought 30s. 6d. per cwt.; medium, 29s. 6d.; beef, fine, 29s. 3d. to 30s.; medium, 26s. per cwt. Prices on 16th May were: Mutton, fine, 29s.; beef, good, 27s. 3d.

Horns.—Extra large, 60s. to 75s.; large, 47s. 6d. to 55s.; medium, 15s. to 42s. 6d.; small, 12s. 6d. to 20s. per 100.

Bones.—Shanks, round, £6 15s. to £7 12s. 6d.; flat, £4 to £4 2s. 6d; mixed, £4 to £4 17s. 6d. per ton; inferior, £3 12s. 6d. to £3 15s.

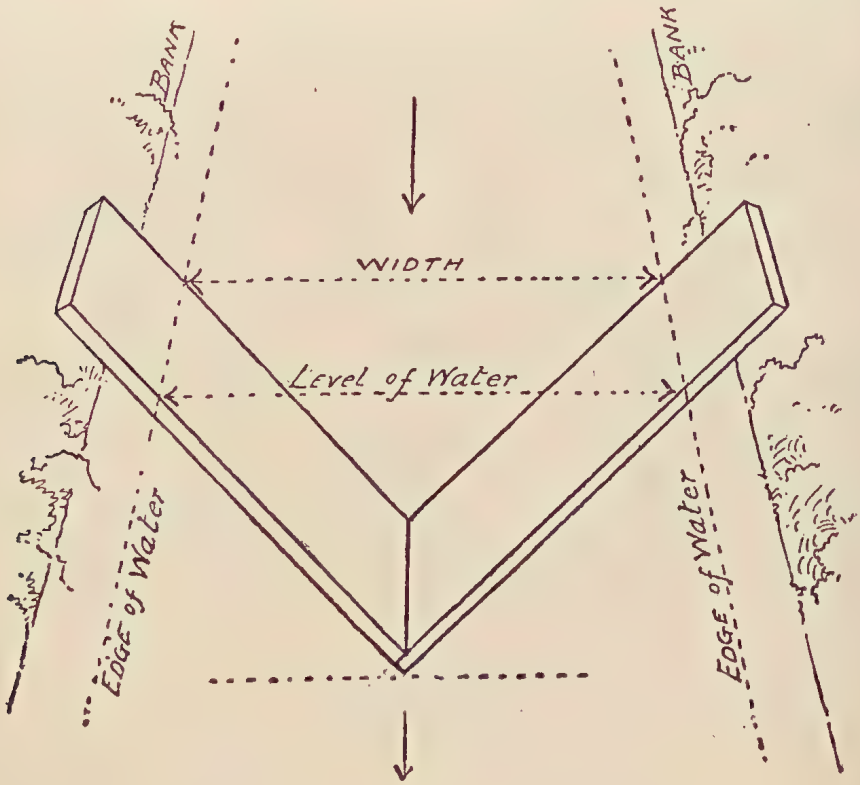
General Notes.

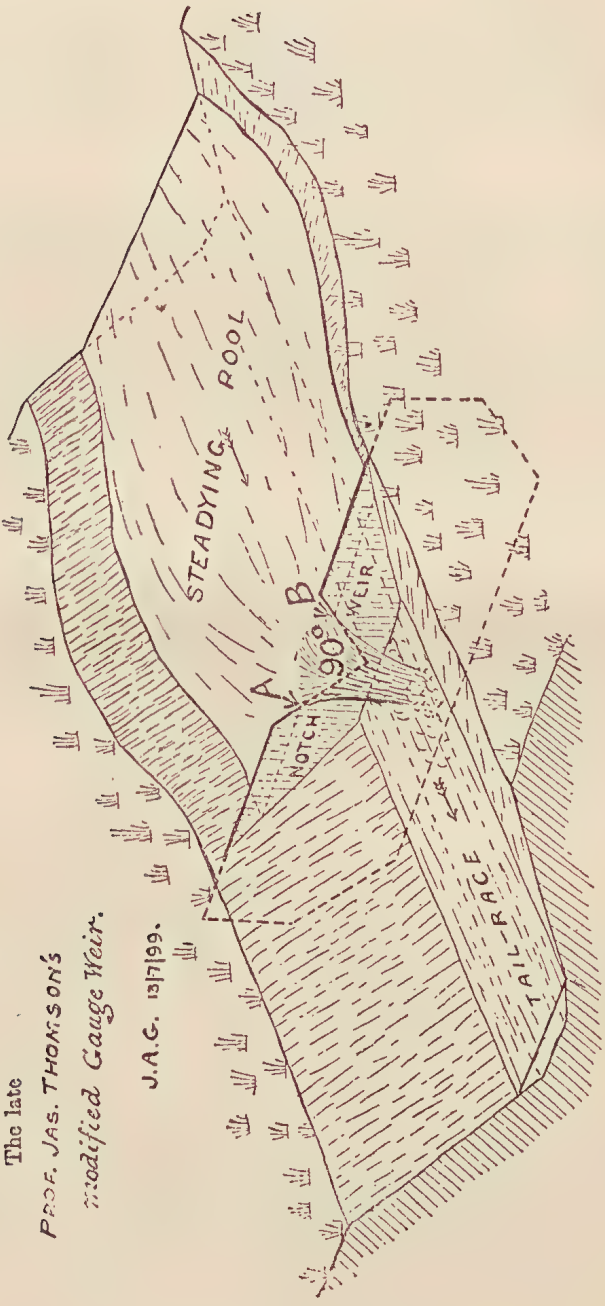
INDIA-RUBBER IN SIERRA LEONE.

THE United States Consul at Sierra Leone reports favourably on the local india-rubber industry. He states, however, that the native collectors are now frequently bleeding the roots of the tree as well as the body—a proceeding which is as fatal to the tree as to the quality of the rubber.

MEASURING STREAMS OF WATER.

MR. W. A. FEUERHEERDT, Crowa Station, Lucindale, South Australia, writes:—During a trip through this district I was surprised, seeing the large number of bores in use, at the primitive and cumbersome method many managers and even the borers themselves use, to ascertain the volume of water per twenty-four hours, the most common being a 400-gallon tank, and timing the filling. The accompanying method should be of great advantage to all having bores, pumps, mills, &c., on a station. The gauge, being made of a board, could be carried on horseback, and the stream tried a mile or two away from the bore, giving an idea of the extent of soakage, &c., as well as at the bore itself. I am sure the enclosed table of gallons per day will be of interest to many of your New South Wales and Queensland readers. I do not think it has ever appeared in your valuable paper, or any other, before. The table is based on Professor James Thomson's formula, the water flowing over a V notch of 90 degrees. The V notch should be set with the two sloping sides equally





inclined to the level, and with the lower point of the V 1 inch to 3 inches above the water flowing away from the notch. Measure the width of the water

flowing through the V notch, and the number in the tables give the volume per twenty-four hours in thousands of gallons. The following are the tables :—

Width	0 in.	1 in.	2 in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	11 in.
	·000	·510	2·88	7·88	16·20	28·33	44·71	65·80	92·05	123·7	161·4	205·2
¼	·020	·905	3·84	9·64	18·25	32·01	49·56	71·90	99·40	132·6	171·7	217·3
½	·100	1·430	5·00	11·61	21·72	36·01	54·70	78·26	107·06	141·8	182·8	230·0
¾	·253	2·080	6·33	13·80	24·93	40·22	60·10	84·92	115·25	151·4	193·8	243·0

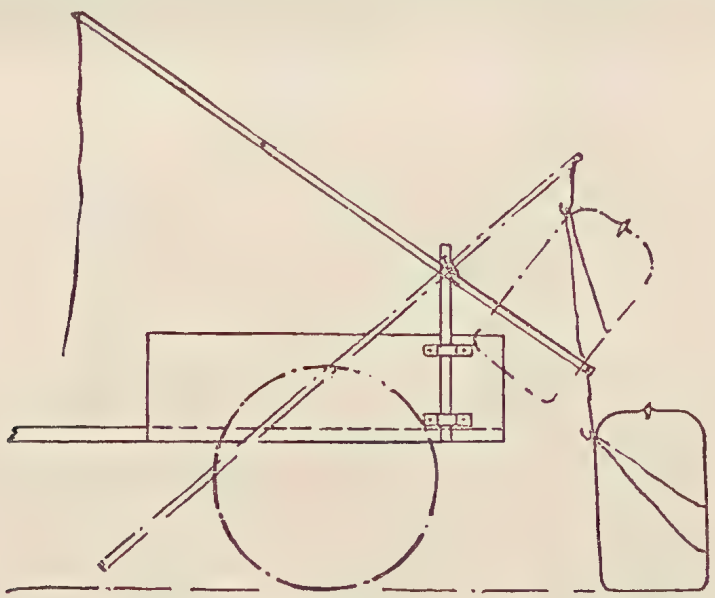
Width	12 in.	13 in.	14 in.	15 in.	16 in.	17 in.	18 in.	19 in.	20 in.	21 in.	22 in.	23 in.
	256·3	314·5	380·0	454·5	537·2	629·2	729·4	841·7	963	1096	1240	1397
¼	270·1	330·2	398·0	474·5	559 2	649·0	756·3	871·4	996	1131	1278	1439
½	284·6	346·6	416·5	494·9	582·0	677·4	784·0	890·6	1027	1166	1316	1481
¾	299·3	363·0	435·3	515·8	605·4	703·2	812·4	931·8	1061	1207	1356	1524

—*Australasian.*

The table is given by Mr. J. B. Henderson, Hydraulic Engineer, in the fifteenth report of the Water Supply Department of Queensland for 1899.—Ed. *Q.A.J.*

A SIMPLE WAGON-LOADER.

THE following sketch shows roughly how to save some of the heavy lifting when loading grain or other produce :—Two iron clamps are wanted on the rail and bedplate, as shown, into which a wooden standard 6 feet long can be affixed.



At the top of the standard a long pole is slung by a piece of raw hide or chain. At the short end of the pole a hook is attached, and this takes hold of the loops of the sling which is placed around the bag. A line should also be attached to the short end for pulling down. The leverage afforded by the longer end of the pole makes loading an easy job.—*S.A. Journal of Agriculture.*

TO PRESERVE EGGS.

ONE gallon of boiling water to be poured on ½-lb. of quicklime. When cold, add 2 oz. of cream of tartar and 2 oz. of common salt. Stir for a few days occasionally, and then pour off the pickle into a wide-mouthed jar, and do not leave too much lime at the bottom, or the eggs will become set fast in the lime. Place the eggs in carefully, put a cover on the jar, and keep it in a cool place away from either sun or frost.

TRANSMISSION OF COLOUR IN HORSES' HAIR.

The transmission of the colour of the hair of horses is of some importance if you desire to rear pairs. On this point Professor Wilckens reports as follows:—If the horse and mare have the same colour, out of 1,000 foals the transmission of such colour can be expected on the average in 856 cases. If both are white, a large number up to 900 may be calculated upon; if both are bay, actually up to 976. If the colour of the hair of the parents is not the same, 437 foals take the colour from the father and 508 from the mother, 55 have an altogether different colour, brown being prevalent where the colour is diverse. In 1,000 foals black was transmitted only to 116 where the horse was black, and to 92 where the mare was of that colour.

AMERICAN TRADE IN SNUFF, TOBACCO, AND CIGARS.

Mr. Neville, Queensland Tobacco Expert, says that snuff is used by the women of the rural districts of the cotton States of America to a very large extent. They take the inner bark of the hickory and chew the end until it forms a kind of brush. This is dipped into the snuff, and they then rub it on to the teeth and gums. It is, in fact, a sort of substitute for chewing.

In January, 1900, there were manufactured in the United States 1,571,646 lb. of snuff, 442,512,494 cigars, 44,559,420 little cigars, 221,932,133 cigarettes, and 24,467,372 lb. of chewing and smoking tobacco.

FORESTS IN BOHEMIA.

In his annual address before the State Forestry Association, President B. S. Hoxie, of Wisconsin, in urging forest experiments, said:—We are not in the dark concerning the preservation of forests, because in the old world it is no longer an experiment. Bohemia is one of the most populous countries on the globe. Its climate is cool with rather severe winters. As a consequence large quantities of fuel are used, most of which is taken from the forests that cover the mountain sides. For many centuries these forests have furnished fuel and building material for a dense population, and retained nearly their primeval area. This is due to the forethought of the Government in ordaining that as trees were cut down others should be planted to fill the vacancies. Now vast stretches of dense forests cover the mountain slopes.

SALT FOR WEEVILS.

Some time ago we heard of a farmer who had stored some corn in salt sacks, and found that, whilst the weevil had badly invaded some other corn in flour sacks, that in the salt sacks was quite uninjured. A writer in the *New York Tribune* now comes forward with his experience on the subject. He has made the same discovery, having sacked up a lot of cow peas in salt sacks with the salt still clinging to them. When he was ready to market the peas he unsacked them all, and found, to his surprise, that the peas in the salt sacks were in perfect condition, whilst those in the other sacks were almost destroyed by weevils. The next season he used the salt sacks with perfect success. When he pulled his corn and stacked it in the barn with the husk on, he dissolved a quart of salt in two gallons of water, and, as he threw the corn on, gave each layer a sprinkling. He has never been troubled with insects since.

HAMBURG'S TRADE IN EGGS.

Mr. William Ward, Her Majesty's Consul-General at Hamburg, in a despatch to the Foreign Office, states that there has been of late years a considerable development in Hamburg's import and export trade in eggs. The total value of the eggs imported into that port in 1898, by sea and land, amounted to £1,208,200, whilst the exportations in the same year attained a value of £833,400. These figures were larger than the corresponding totals of 1897

and 1896, in which years the imports were valued at £1,203,200 and £1,125,400, and the exports at £833,000 and £799,400 respectively. The quantities arriving and despatched were, however, somewhat greater in 1897, so that the intrinsic value of the eggs was considered to be somewhat higher in the later year.

ARTESIAN IRRIGATION.

IT is not generally known that more than 16,000 acres of cultivated land and native grass lands were irrigated in Queensland from artesian bores and tanks during the year 1899.

The Hydraulic Engineer, in his fifteenth annual report, gives the areas under different crops so irrigated as follow:—

Sugar-cane and tropical products, 6,839 acres; fruit (including bananas) and vegetables, 573 acres; maize, lucerne, and cereals, 415 acres; potatoes and kitchen produce, 106 acres; grasses, 8,096 acres.

There is a marked increase of the area irrigated under fruit, potatoes, and vegetables, while the area of irrigated land under maize, lucerne, and cereals is less. The area irrigated from artesian bores has continued on the increase. Besides the areas above given, many stations, not mentioned in the returns, use bore water for irrigation purposes on a small scale, but of these plots no estimate has been formed.

FARMING AT DAKOTA, U.S.A.

IT may interest some of our readers to learn how wheat is raised on some of the large farms in Dakota. *Farm and Dairy* publishes the following account of how the work is done on Mr. N. G. Larimore's famous South Dakota wheat farm of 10,000 acres:—

For ploughing, mule teams of five are used, driven by one man, hitched to a gang-plough which he rides, and which consists of two separate ploughs turning a furrow 14 inches wide, or two of 28 inches, at a time. In breaking up new land this furrow is only 2½ to 3 inches deep, to cut up the grass roots, which is done in June, and left to rot till July or August, when it is back-set or ploughed 3 inches deeper, then harrowed in the autumn, when it is ready for spring seeding. The second year's ploughing is done by the same number of mules and deep enough at one ploughing to fit it for horrowing and seeding. One of these gang-ploughs and teams plough up 6 to 7 acres a day. The field is 6 miles long, and a team makes one round trip, or 12 miles in half a day, or 24 miles a day. The farm employs 40 of these gang-ploughs and 200 mules to run them, and 40 men. Every five years they summer-fallow their ground, ploughing it after seeding time 3 inches deep, harrow it later for the weeds, then plough it again in the fall and harrow ready for seeding in the spring, thus resting the ground in lieu of fertilising. Yet some seed it right along and even put the land in flax seven years running without affecting the crop, though it was supposed to be a most exhausting crop. Flax is generally sown for the first crop after breaking up the prairie, as it can be seeded the same year, while for wheat it must lie one year for the grass roots to rot before seeding. The Larimore farm has 65 self-reapers and binders, each run by three mules and one driver, which cut and bind 18 to 20 acres of wheat per day. The country is all flat and treeless except along the streams, but a plentiful supply of cold pure water is found 10 to 15 feet below the surface, with neither stones nor roots to interfere with cultivation. They raise barley as well as wheat and flax, and use it in place of corn-maize for feed, and pigs fed upon it bring ¼d. per lb. more than corn-fed, as the meat is sweeter. Pigs are now a regular product of wheat farms as a consequence. An interesting computation of the number of miles of furrow made in one day by the 40 gang-ploughs, as above, shows that each gang ploughs 48 miles of single furrow, and the 40 gangs 1,920 miles daily.

WOOL FROM LIMESTONE.

An American chemist is said to have discovered a process by which Alexandria limestone can be converted into a substance resembling wool, the threads of which are strong enough to admit of their being woven. The staple is, however, too short for the purpose. But the product has evidently a commercial value, as we are told that it is in extensive use for packing round refrigerators, boiler cases, and pipes to preserve the heat in the latter case. It is also used for deadening the sound on floors, and large quantities are being shipped to the Philippine Islands, to be used as a non-conductor in the storehouses of the American troops.

SAVE YOUR OWN SEEDS.

Some persons think they are exercising economy when they save their own seeds, but only seldom indeed is this so. The seeds you purchase from a respectable seedsman are generally from selected stocks, grown purposely for their seeds, and not for their roots or their tops to be used as vegetables. The greatest care should be taken by the person who saves his own seeds in selecting the finest specimens of their kind, whereas the amateur generally uses the best for consumption, and then, when the plant is nearly exhausted, it is allowed to go to seed. Plants raised from such impoverished sources cannot be expected to produce strong fertile crops. A fine cabbage or cauliflower may be allowed to go to seed, but no other plant of the same family must be permitted to be in flower at the same time in the same garden, or within a good distance of it, if the seed is wanted to be pure. The same remark applies to other vegetables. In nine cases out of ten it is better to buy your seeds than to save them yourself.—*Martin's Home and Farm.*

AUSTRALIAN SALTBUSH.

Commenting on an account of the trials carried out at the Agricultural Experiment Station of the University of California in the cultivation of Australian saltbush, the editor of the *Journal of the Department of Agriculture of Western Australia* speaks to the point. He says:—"The immense importance attached to the cultivation of our Australian saltbushes in California and Cape Colony contrasts strangely with the apathy evidenced in Australia generally regarding the destruction of these most valuable fodder bushes. It is quite the exception here, in South Australia at least, to find anyone attempting to cultivate the saltbushes, though a number of landowners may have a plant or two in their gardens. The Agricultural Bureau has repeatedly offered to supply saltbush seed free to anyone desirous of growing it, but very few have availed themselves of this offer, and most of the seeds collected for distribution has been forwarded to other countries, where they are appreciated. Out of the number who did apply for seed, not more than a dozen have ever reported results. One of those who forwarded reports—Mr. F. Calf, of Riverton—states that he simply scattered the seed broadcast last autumn on some poor land that had been scarified, and quite a number of plants came up and grew well until the cows got in and damaged them; while Mr. C. N. Grenfell, of Mount Templeton Public School, got *Atriplex angulata* and *A. vesicarium* to grow luxuriantly on alkali soil which would not grow wheat, the bushes being 2 feet across in February, 1899, after about seven months' growth from seed. In this colony, seeds or cuttings planted after the first autumn rains will probably give most satisfactory results. It is important to bear in mind that the seed must be very lightly covered. Cuttings may be 9 inches to 12 inches long, of young firm wood, set 6 inches to 9 inches in the soil. If the plantation is well protected from stock it will produce large quantities of seed and will rapidly extend in area. The *Atriplex semibaccata*, so favourably spoken of by the Californians, is a prostrate bush with thin stems and small leaves of pale-green, and is found in many parts of the North, especially on the railway reserves where protected from stock, and single plants will often be found covering 4 feet to 6 feet of ground. Cultivation of the land for

wheat has entirely destroyed the perennial saltbushes on most of our northern farms. Almost ever since the bureau was established, the necessity for preserving and cultivating our indigenous saltbushes and other shrubs has been urged, but with little avail. The oft-repeated recommendation that several acres on every farm in the North should be set apart and planted with saltbush as a reserve for stock in seasons of drought has met with ridicule from many, but there is little doubt that if some of our farmers would try the experiment they would receive ample reward for their labour and expense. There is no doubt whatever that the saline properties of saltbush greatly tend to keep stock in good health, and, although at first it may be difficult when other feed is available to get some stock to touch it, as soon as they get used to it they will eat it with relish."

AGRICULTURAL EDUCATION.

"WHO wants agricultural education?" asks Sir Edmund Verney in the *Humanitarian.* Not the labourer, he says; not the farmer; very seldom the landowner. The people who want it most are "those who know least about agriculture." Sir Edmund playfully criticises all the advocates of technical education in rural districts, and tells this story:—"A body of farmers in a purely rural district complained of the way in which the technical education money was spent. When pressed to say how they would like it spent, they agreed at last that nothing was so much wanted as instruction in hedging and ditching. With some difficulty the county council committee was induced to apportion funds for this purpose, and a neighbouring landowner offered prizes for those who learned best. When all was arranged and circulars were printed, for some reason not one of the farmers would send a pupil to learn. At length one of them honestly blurted out that he did not wish his men to learn, or they would leave him and get better-paid work elsewhere. At the same time some eight or ten young men, out of work, were seen disporting themselves on the ice; they were invited to attend the three weeks' course and to compete for the prizes; but they declined, saying they did not go in for that kind of labour; they preferred to amuse themselves until they could get their usual unskilled work." Notwithstanding, Sir Edmund himself is an advocate of agricultural education. Unhappily, he does not see many more able than those he pokes fun at to say what agricultural education should consist of, or how it should be taught.—*Mark Lane Express.*

EXPORT OF HONEY.

A SMALL shipment of honey (says the *Sydney Mail*) was lately made by Mr. Dight, M.L.A., to the London market. He shipped about 1½ tons from his own apiary, which is a small one. At that time, the best offer he could get for his honey was 1½d. per lb. The returns he received from London recently showed that it realised the gross price of 2·571d. per lb. The expenses amounted to ·633d. per lb., leaving a net return of 1·908d. or almost 2d. per lb. This is, of course, a small price for London, but it exceeded local values, and is, therefore, encouraging.

TO CONCRETE A MILKING YARD.

A CORRESPONDENT wishes to put a concrete floor into a milking yard and shed 50 feet long by 30 feet wide, and asks for particulars of the work to be done.

The concrete should be made as follows:—1 part cement, 4 parts gravel—the gravel should contain, naturally, enough rough sand for the purpose—2 parts broken metal or stone, not over 2 inches cube; but all gravel—*i.e.*, 6 parts—would do as well as, if not better than, stone. Fine sand should not be used under any conditions.

Twenty casks of cement should make a good floor if the foundation is good, and even the thickness of the floor need not exceed 4 inches. The floor should be kept well wetted for several days after laying down. It should have a gradual fall from the bails to the outside. The area of floor will be a fraction over 166 square yards.

The concrete may be laid on the surface of the ground, as it is better not to break the crust.

DEGILBO DISTRICT FARMERS' ASSOCIATION.

WE are informed by the honorary secretary to the above association that, owing to the serious drought being experienced in the Degilbo district, it has been determined to postpone the show, which was to have taken place on the 21st and 22nd June, to 3rd and 4th January, 1901, when it is hoped that an agricultural show can be held with greater chance of success than if it were held this year.

THE AGRICULTURAL AND PASTORAL SOCIETY OF SOUTHERN QUEENSLAND, BEENLEIGH.

THE Department of Agriculture have offered prizes as follow for competition at the forthcoming show of the above society on Friday, 7th September:—

	£	s.	d.
For best collection of vegetables	1	1	0
Best two calves not less than six months old, fed on separated milk	1	1	0
Best cow in milk, yielding greatest amount of butter-fat	1	1	0
Best bull, suitable for dairying purposes ...	1	1	0
Best draught sire	1	1	0
Best boar, any age	1	1	0
Best sow, any age	1	1	0
Total	£7	7	0

AGRICULTURAL AND HORTICULTURAL SHOWS.

THE Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respective shows, notify him of the date, and also of any change in date which may have been decided on.

The Markets.

AVERAGE PRICES FOR APRIL.

Article.		APRIL. Top Prices.		
		£	s.	d.
Bacon	lb.	0	0	7
Bran	ton	6	8	9
Butter, First	lb.	0	0	9⅜
Butter, Second	,,	0	0	6½
Chaff, Mixed	ton	3	13	9
Chaff, Oaten	,,	4	10	0
Chaff, Lucerne	,,	4	3	1½
Chaff, Wheaten	,,	3	1	3
Cheese	lb.	0	0	5⅝
Flour	ton	8	2	6
Hay, Oaten	,,	4	0	0
Hay, Lucerne	,,	4	6	10½
Honey	lb.	0	0	1 3/16
Rice, Japan (Bond)	ton	14	15	0
Maize	bush.	0	3	5
Oats	,,	0	3	8¼
Pollard	ton	6	8	1½
Potatoes	,,	5	13	9
Potatoes, Sweet	,,	1	15	0
Pumpkins	,,	2	0	0
Sugar, White	,,	16	15	0
Sugar, Yellow	,,	12	15	0
Sugar, Ration	,,	10	15	0
Wheat	bush.	0	3	3
Onions	cwt.	0	5	2¼
Hams	lb.	0	0	9½
Eggs	doz.	0	1	5 1/16
Fowls	pair	0	2	8¼
Geese	,,	0	5	6
Ducks, English	,,	0	3	2¼
Ducks, Muscovy	,,	0	4	0
Turkeys, Hens	,,	0	7	4½
Turkeys, Gobblers	,,	0	12	7½

ENOGGERA SALES.

Article.	APRIL. Top Prices.		
	£	s.	d.
Bullocks	7	5	0
Cows	4	10	0
Wethers, Merino	0	14	10½
Ewes, Merino	0	10	7½
Wethers, C.B.	0	16	11¼
Ewes, C.B.	0	12	3
Lambs	0	12	4½
Baconers	1	5	8
Porkers	0	19	1½
Slips	0	5	2

Orchard Notes for June.

BY ALBERT H. BENSON.

THE marketing of citrus fruits is still one of the principal operations in many orchards throughout the colony, and the remarks anent this matter that have appeared in these Notes for the past two months should be borne in mind and acted upon, as, no matter what the quality of the fruit may be, it always sells best when well packed and attractively got up, as the better it looks the better it sells.

In many parts of the colony deciduous fruit trees should be pruned during the month, and I strongly advise fruitgrowers to read my remarks on this subject which appeared in a previous issue of this *Journal*, as thorough pruning is seldom carried out, many trees being allowed to grow of their own sweet will without let or hindrance. This neglect to properly prune fruit trees is conducive to the rapid spread of many insect and fungus diseases, as when trees are allowed to grow into a dense bush it is impossible to keep them clean by means of any of the ordinary methods adopted for the eradication of disease, such as spraying, &c.; and when they are allowed to straggle all over the place, the straggling limbs are very apt to become more or less diseased.

Old neglected trees of good varieties, and of which the roots are still healthy, should be cut hard back, and all dead, broken, or badly diseased branches should be cut off, and a new head be allowed to form; but where such trees only produce inferior fruit, that is of no commercial value, they should be either destroyed, or, if wished, they may be grafted on next spring with good valuable varieties. Old neglected trees are the breeding-grounds of many diseases, and when they are of no value whatever they should be destroyed, as they are a menace and source of infection to the neighbourhood in which they are growing.

Do not be afraid to prune too heavily, as it is better to lose a crop and thereby get your tree or trees into a healthy state than to leave them in an unhealthy and unpruned condition, and get a poor crop of inferior fruit. Prune hard, and gather up and burn all prunings; do not let them lie about, but burn them up, as by doing so any diseases that may be on the wood that has been pruned off will be destroyed. Where trees are hard cut back, and only the main limbs are left, it is advisable to follow up this same pruning with a dressing that will destroy all insects or fungus pests still remaining on the tree, and for this purpose the best remedy is to paint the stems and branches with the following mixture, prepared thus:—Boil 2 lb. of sulphur and 1 lb. of quicklime in 2 gallons of water for about one hour, then add fine clay to the mixture till it is as thick as paint, and apply with a brush. Fine flour can be used in the place of the clay if desired, and will render the mixture more lasting.

Where San José, Greedy, Mussel, or Parlataria Scales are present, this method of treatment is the most efficacious, and is even better than spraying with the sulphur, lime, and salt wash mentioned in my pamphlet on spraying. This mixture is also of value for painting the stems and main branches of citrus trees covered with mosses or lichens, or attacked by White, Red, Circular Black, Mussel, or other scale insects.

Where the ground is ready, plant deciduous trees this month; do not plant too deep, and cut back hard at planting Clean up the orchard thoroughly, and plough and leave the ground rough as soon as pruned and the prunings are burnt. Gather up and destroy all fly-infested fruit of all kinds, as the

more thoroughly the fly is kept down during the winter on the coast the fewer flies there will be to deal with in spring. Where not already done, see that pineapples are protected from frost, and keep the ground between the plants well worked in order to retain moisture, as the winter months are usually dry and the plants are liable to injury through drought. The same remarks apply to bananas, and the unripe bunches of fruit should be protected from slight frosts or cold spells by any suitable available material.

Farm and Garden Notes for June.

Farm.—The farming operations for the month may be summarised as follows:—

The land has by all practical farmers been ploughed, harrowed, and made ready for sowing. Pasture grasses will already have been sown in many instances. Where this has not been done, no time should be lost in sowing all kinds of grasses, especially those mentioned in the last number of the *Journal*. Wheat, barley, oats, rye, vetches, and lucerne should be sown. Frosts will have already occurred in many parts of the Southern and Western districts. Insect life is now fairly dormant, and weeds will no longer be a source of trouble and expense to the farmer. Hence a good opportunity occurs to sow lucerne and grass seeds. Tobacco, mangolds, swedes, carrots, chicory, and buckwheat may be sown. Now is time to get the land ready for maize, millets, sorghum, panicum, &c. Some recommend sowing maize in sheltered situations, but we would strongly advise deferring the sowing of maize, no matter how sheltered the land may be. All that should be done now is to get the land ready and in proper condition to receive the seed towards the latter end of July and in August. The same remark applies to potatoes. Early potatoes should not be planted till next month, and then only in very sheltered positions. The arrowroot crops will shortly be ready to take up, but wait until the tops are blackened and the bulbs have properly filled. Dig sweet potatoes, yams, and ginger. If you wish to store sweet potatoes, see that they are thoroughly ripe. To make sure of this, break a potato, and notice if the juice, when dry, is of a dark colour. If so, the potato is not ripe. But if the juice, when dry, remains white, the tubers are ready to be taken up. But they are not yet ready to be stored away any more than apples are ready to be packed in cases or barrels the moment they are gathered. The latter fruit wants airing by exposure. So do sweet potatoes. Spread them out in the field or farm for several days. This is a kind of curing process. Then lay down a thick layer of sand, on which place the first layer of tubers. Pour sand over them till they are completely covered. Then add more potatoes; pour on sand as in the first instance, and continue this till all your potatoes are pitted. The air is thus excluded, and you can keep the potatoes right through the winter. The place of storage should be cool, as hot weather is injurious to them, and even in a Queensland winter hot days are experienced.

Wheat may be sown, and it is worth noting that early-sown wheat will often escape rust and other evils which affect later crops.

Do not attempt a field crop of onions, for it is too late.

Kitchen Garden.—Hoe well among all crops. Transplant horse-radish, eschallots, rhubarb, strawberries, and sea-kale. Give new asparagus beds a second digging. In planting rhubarb it will be found more profitable to buy the crowns from a seedsman than to grow them from seed. The same remark applies to asparagus. In planting rhubarb, asparagus, and sea-kale use plenty of well-rotted manure. Watercresses may be planted this month, and good crops may be raised in garden beds if well watered. It is a fallacy to think that watercresses will only grow in running water; very good crops can be got on even gravelly and shaley soil by the liberal use of water. The plants should be treated like celery plants. Dig in plenty of good old manure into the bottom of the trench, and sift a little fine soil over it. Dibble the cuttings in at 1 foot apart, filling up the holes lightly with rich mould, and give the whole a good watering—not a dash from a bucket, but a gentle steady sprinkling from a fine-rose watering pot which will fall "like the gentle rain from Heaven," blessing alike the giver and receiver. In a month or six weeks, the cresses can be cut. After cutting, give the beds a good dressing of manure, and water well.

Sow all European vegetables and herbs. Thin out all earlier sowings. Keep down the weeds, and thoroughly cultivate the land between the crops. Towards the end of the month sow tomatoes in a frame where the young plants will be protected from frost.

Plant out cabbages, cauliflowers, and lettuces as soon as they are large enough.

Public Announcements.

THE Editor will be glad to receive any papers of special merit which may be read at meetings of Agricultural and Pastoral Associations in Queensland, reserving, however, the right to decide whether their value and importance will justify their publication.

THE *Queensland Agricultural Journal* will be supplied to all members of Agricultural and Horticultural Societies who do not derive their livelihood solely from the land, on payment, in advance, of an annual subscription of 5s.

ADVERTISEMENTS.

ADVERTISEMENTS which relate wholly to the sale of Agricultural Machinery, Seeds, Plants, Manures, Farm Stock, Feeding Stuff, &c., will be inserted in the *Journal* at the following rates :—

	£	s.	d.
Full page, per issue	4	0	0
Half page, per issue	2	10	0
Quarter page, per issue	1	10	0

On advertisements standing for six months a discount of 15 per cent. will be allowed, and 25 per cent. on those inserted for twelve months.

LIST OF AGRICULTURAL, HORTICULTURAL, AND PASTORAL SOCIETIES AND ASSOCIATIONS IN QUEENSLAND.

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Allora ...	Central Downs Agricultural and Horticultural Association	J. H. Buxton... ...	7 Feb.
Avondale ...	Avondale Farmers' and Planters' Association	N. J. Mikkelsen ...	
Ayr	Lower Burdekin Farmers' Association ...	Winsor H. Wilmington	
Beaudesert ...	Logan and Albert Pastoral and Agricultural Society	M. Hinchcliffe ...	11 May
Beenleigh ...	Agricultural and Pastoral Society of Southern Queensland	Wilson Holliday ...	7 Sept.
Biggenden ...	Biggenden Agricultural and Pastoral Society	Charles H. Peppin ...	14 June
Biggenden ...	Biggenden Farmers' Association	Charles H. Peppin ...	
Birthamba ...	South Kolan Agricultural and General Progress Association	G. W. Nixon ...	
Blackall ...	Barcoo Pastoral Society	F. Clewett	
Boonah ...	Fassifern and Dugandan Agricultural and Pastoral Association	J. A. McBean ...	14 and 15 June
Bowen ...	Pastoral, Agricultural, and Mining Association	J. E. Smith	9 Aug.
Bowen ...	Preston Farmers' Association, Lower Proserpine	G. Archer	
Bowen ...	Preston and Mount Marlow Farmers' Association, Lower Proserpine	D. W. Lanzky ...	
Booyal ...	Booyal Farmers' Progress Association ...	Thos. Skillington ...	
Brisbane ...	Horticultural Society of Queensland	J. F. Bailey	26 and 27 April
Brisbane ...	Moreton Agricultural, Horticultural, and Industrial Association	J. Duffield	
Brisbane ...	Queensland Acclimatisation Society	E. Grimley	
Brisbane ...	Queensland Fruit and Economic Plant Growers' Association	G. K. Seabrook ...	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Brisbane ...	National Agricultural and Industrial Association of Queensland	H. C. Wood	10, 11, and 12 Aug.
Brisbane ...	Queensland Stockbreeders' and Graziers' Association	F. A. Blackman ..	
Brisbane ...	United Pastoralists' Association	Fredk. Ranson ...	
Bundaberg ...	Bundaberg Horticultural and Industrial Society	Jos. Campbell ...	
Bundaberg ...	Council of Agriculture	Jos. Campbell ...	
Bundaberg ...	Woongarra Canegrowers' and Farmers' Association	W. H. Dart	
Burpengary...	Burpengary Farmers' Association	C. H. Ham	
Byrnestown...	Byrnestown Farmers' Progress Association ...	J. Duffiey	
Caboolture ...	Caboolture Farmers' Association	G. Mallet	
Cairns ...	Aloombah Farmers' Association	Chas. R. Spencer ...	
Cairns ...	Cairns Agricultural, Pastoral, and Mining Association	A. J. Draper	28 and 29 Sept.
Cairns ...	Cairns District Coffee Growers' Association...	W. A. Hannam ...	
Cairns ...	Cairns District United Farmers' Association	Wm. Griffin ...	
Cairns ...	Hambledon Planters' Association	E. Whitehouse ...	
Charleville ..	Central Warrego Pastoral and Agricultural Association	E. F. C. Manning ...	25 and 26 May
Charters Towers	Towers Pastoral, Agricultural, and Mining Association	W. Tilley	30 and 31 May; 1 June
Childers ...	Isis Agricultural Association	H. Epps	
Childers ...	Doolbi Mill Branch, Isis Agricultural Association	W. T. H. Job ...	
Childers ...	Childers Mill Branch, Isis Agricultural Association	H. Epps	
Clermont ...	Peak Downs Pastoral, Horticultural, and Agricultural Society	F. Leysley	
Clermont ...	Peak Downs Dairymen and Settlers' Association	A. G. Pursell ...	
Cooktown ..	Cook District Pastoral and Agricultural Society	W. R. Humphreys ...	
Cooran ...	Cooran Progress and Agricultural Association	Thos. Smith	
Cordalba ...	Cordalba Farmers' Association	B. Goodliffe	
Currajong ...	Currajong Farmers' Progress Association ...	Wm. Howard ...	
Cunnamulla	South Warrego Pastoral Association	J. Winward	
Dalby ...	Northern Downs Pastoral and Agricultural Association	W. M. Alexander ...	July
Deception Bay	Deception Bay Farmers' Association	B. J. T. Liscombe ...	
Degilbo ...	Degilbo District Farmers' Association ...	J. Harvey	3 and 4 Jan., 1901
Gayndah ...	Gayndah Agricultural and Horticultural Association	J. C. Kerr	
Gladstone ...	Gladstone Pastoral and Agricultural Association	W. J. Manning ...	
Gooburrum, Bundaberg	Gooburrum Farmers' and Canegrowers' Association	W. J. Tutin	
Goondiwindi	MacIntyre River Pastoral and Agricultural Society	A. Warden	
Gympie ...	Agricultural, Mining, and Pastoral Society	F. Vaughan	13 and 14 Sept.
Gympie ...	Chatsworth Farmers' Progress Association ...	William Bellman ...	
Gympie ...	Deep Creek Farmers' Progress Association ...	W. Reid	
Gympie ...	Gympie Horticultural Society	Charles Brasch ...	19 and 20 April
Gympie ...	The Pie and Eel Creek Farmers' Association	Wm. H. Ryan ...	
Gympie ...	Gympie Central Farmers' and Progress Association	J. Howard Maynard	
Haslemore, Victoria, Herbert Riv.	Herbert River Farmers' League	Alfred Henry ...	
Helidon ...	Helidon Scrub Farmers' Progress Association	Jas. Tysoe	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Herbert River	Halifax Planters' Club	H. G. Faithful ...	
Herbert River	Macnade Farmers' Association...	Edwin S. Waller ...	
Herbert River	Ripple Creek Farmers' Association	J. W. Grimes ...	
Herberton ...	Mining, Pastoral, and Agricultural Association	John M. Hollway ...	3 and 4 April
Hodgson ...	Hodgson Farmers' Association	C.W. Nimmo ...	
Hughenden...	Hughenden Pastoral and Agricultural Association	H. P. Blackall ...	7 and 8 May
Ingham ...	Herbert River Farmers' Association	...	
Ingham ...	Herbert River Pastoral and Agricultural Association (Stock Show).	P. J. Cochrane ...	15 and 16 June
Ingham ...	Herbert River Pastoral and Agricultural Association (Agricultural Show)	P. J. Cochrane ...	Sept.
Ipswich ...	Ipswich and West Moreton Agricultural and Horticultural Society	P. W. Cameron ...	21 Sept.
Ipswich ...	Queensland Pastoral and Agricultural Society	Elias Harding ...	11 and 12 July
Kandanga (near Gympie)	Kandanga Farmers' Association	N. Rasmussen ...	
Kolan ...	Kolan Canegrowers' and Farmers' Association	C. Marks	
Ladeside ...	Mungore Farmers' Association...	J. M. Robinson ...	
Laidley ...	Lockyer Agricultural and Industrial Society	John Fielding ...	25 and 26 July
Loganholme...	Logan Farming and Industrial Association ...	F. W. Peek	
Longreach ...	Longreach Pastoral and Agricultural Society	J. P. Peterson ...	17 and 18 April
Lucinda Point	Victoria Farmers' Association	W. S. C. Warren ...	
Mackay ...	Agricultural, Pastoral, and Mining Association	F. Black	
Mackay ...	Pioneer River Farmers' Association	E. Swayne	28 and 29 June
Mapleton, *viâ* Nambour	Mapleton and Dulong Fruitgrowers' and Farmers' Progress Association	W. J. Smith	
Maryborough	Maryborough Horticultural Society	H. A. Jones	
Maryborough	The Island Farmers' Progress Association ...	C. A. Schmidt ...	
Maryborough	Wide Bay and Burnett Pastoral and Agricultural Society	G. Willey	4, 5, and 6 July
Miallo ...	Miallo Progress Association	E. F. Welchman ...	
Milbong ...	Milbong Farmers' Association	T. R. Garrick ...	
Mitchell ...	Mitchell and Maranoa Pastoral, Agricultural, and Vinegrowers' Association	H. J. Corbett ...	
Mosman River	Mosman River Farmers' Association	Geo. W. Muntz ...	
Mount Cotton	Mount Cotton and Tingalpa Division Fruitgrowers' and Farmers' Association	F. N. Sharman ...	
Mount Mee...	Mount Mee Farmers' Association	R. Thomas	
Mount Morgan	Mount Morgan Mining, Agricultural, Poultry, Pastoral, and Horticultural Society	G. Orford	
Mount Morgan	Mount Morgan Agricultural, Pastoral, and Poultry Society	Thos. W. Walker ...	
Mundoo ...	Johnstone River Farmers' Association ...	J. McInnes	
Nerang ...	South Queensland and Border Pastoral and Agricultural Society	W. J. Browne ...	8 Sept.
North Isis ...	North Isis Canegrowers' Association	W. J. Young ...	
Pialba ...	Pialba Farmers' Association	J. B. Stephens ...	
Pickenjennie	Wallumbilla Selectors' League...	George Dalziel ...	
Pickenjennie	Pickenjennie Branch, Wallumbilla Selectors' League	George Dalziel ...	
Pinbarren ...	Pinbarren Agricultural and Progress Association	H. Armitage, senr. ...	
Port Douglas	Pastoral, Agricultural, and Mining Association	W. H. Dorrat ...	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*coatinued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Razorback ...	The Razorback Fruitgrowers' Association ...	Robert Tinning ...	
Rockhampton	Central Queensland Farmers' and Selectors' Association	T. Whitely, Coowonga	
Rockhampton	Central Queensland Pastoral Employers' Association	G. Mackay	
Rockhampton	Central Queensland Stockowners' Association	R. R. Dawbarn ...	
Rockhampton	Rockhampton Agricultural Society	R. R. Dawbarn ...	29 and 30 May
Roma ...	Western Pastoral and Agricultural Association of Queensland	Angus McPherson ...	
Roma ...	Yingerbay Farmers' Association	Alex. C. McIntyre ...	
Rosewood ...	Farmers' Club	P. H. Adams... ...	13 Sept.
Southport ...	Southport Horticultural Society	E. Fass	19 April
Springsure ...	Queensland Pastoral Society	G. R. Milliken ...	
Stanthorpe ...	Border Pastoral, Agricultural, and Mining Society	Geo. Simcocks ...	22 and 23 Feb.
Stanthorpe ...	Stanthorpe Horticultural and Viticultural Society	R. Hoggan	
Stanwell ...	The Stanwell Agricultural Society	A. Spanner	
St. George ...	Balonne Pastoral and Agricultural Association	T. M. Cummings ...	
Tinana ...	Tinana Fruitgrowers' and Farmers' Association	Chas. Parke	
Toowoomba...	Darling Downs Horticultural Association ...	H. Hopkins	
Toowoomba...	Drayton and Toowoomba Agricultural and Horticultural Society	H. Symes	
Toowoomba...	Royal Agricultural Society of Queensland ...	F. Burtt	31 July; 1 and 2 Aug.
Townsville ...	Townsville Pastoral, Agricultural, and Industrial Association (formerly North Queensland Pastoral and Agricultural Association)	J. N. Parkes	6 and 7 June
Wallumbilla	Wallumbilla Selectors' League	George Dalziel ..	
Warwick ...	Eastern Downs Horticultural and Agricultural Association	J. Selke	31 Jan. & 1 Feb.
Wellington Point	Wellington Point Agricultural, Horticultural, and Industrial Association	F. W. Wort	13 June
Woombye ...	Woombye Fruitgrowers' Association	P. S. Hungerford ...	
Woowoonga	Woowoonga Scrub Farmers' Association ...	H. B. Griffiths ...	
Zillmere ...	Zillmere Horticultural Society	C. McF. Fischer ...	20 Jan.

"THE DISEASES IN PLANTS ACT OF 1896."

Department of Agriculture,
Brisbane, 19th January, 1899.

HIS Excellency the Governor, with the advice of the Executive Council, and in pursuance of the provisions of "*The Diseases in Plants Act of* 1896," has been pleased to make the following further Regulations.

J. V. CHATAWAY.

THE FUMIGATION OF FRUIT FOR EXPORT.

1. Any one who wishes to erect a chamber or building for the fumigating of fruit is requested to give notice to the Under Secretary for Agriculture, who will take steps to see that the chamber or building is properly constructed.

2. When it is required to fumigate fruit for export, twenty-four hours' notice must be given to the said Under Secretary or such other officer as may be duly authorised to accept such notice.

3. The operation of fumigating must be conducted under the control of an officer authorised by the Minister for Agriculture.

4. The fumigating chamber may be made of any convenient size or material, the essential point being that it shall be capable of being closed absolutely airtight, and provided with a flue-pipe in the roof which can be opened or closed to allow of the escape of the gas after fumigation. The flue must be provided with a box or chamber to contain caustic soda or potash to destroy the gas.

The fumigating chamber must be provided with a shutter or sliding panel in the lower portion of the door or wall.

Door, flue, and shutter must all be made to close absolutely airtight.

DIRECTIONS FOR FUMIGATING WITH HYDROCYANIC ACID GAS.

Proportions of Ingredients.—For every 150 cubic feet of room take 1 ounce of cyanide of potassium, 5 fluid ounces sulphuric acid, 10 fluid ounces water.

Having placed the fruit to be fumigated in the chamber, see that the flue and the shutter in the door or lower part of all are properly closed.

The acid is then to be diluted in the following manner:—The whole of the water is placed in a shallow china or glazed earthenware vessel, such as an ordinary wash-hand basin. (Metal vessels are inadvisable unless they are leaden ones.) The sulphuric acid is next poured on to the water in a thin stream, stirring the while with a stick. Do not mix by adding the water to the acid.

The basin containing the acid thus diluted (which should be allowed to cool) is now placed in the fumigating chamber, and the cyanide of potassium is emptied into it.

The gas is given off with great violence, and the door should be immediately closed.

The whole is now to be left to itself for one hour. At the end of this time the shutters in the flue and in the door are opened, and the draught produced drives the gas out of the chamber. At the end of half an hour the door is thrown open, and if the draught has been effective there should be hardly any trace of hydrocyanic gas recognisable. The chamber may be left in this condition for another ten minutes or a quarter of an hour. The fruit is now to be moved and allowed to remain in a well ventilated place, preferably out of doors, for another half an hour. Samples of fruit will be examined from time to time by the entomologist.

Caution.—As hydrocyanic acid gas is most deadly in its effects on animal life, the greatest care must be taken in its use.

Department of Agriculture,
Brisbane, , 18 .

This is to certify that has treated cases of citrus fruit with hydrocyanic acid gas for one hour, under my supervision. These cases have been branded "Crown" over "Passed."

Shipping marks:
Per S.S.:
Consigned to:

Department of Agriculture,
Brisbane, 26th January, 1899.

THE following Proclamation by His Excellency the Governor of New South Wales is published for general information.

J. V. CHATAWAY.

NEW SOUTH WALES, to wit. (L.S.) HAMPDEN, *Governor.*

PROCLAMATION.

By His Excellency The Right Honourable HENRY ROBERT, VISCOUNT HAMPDEN, Governor and Commander-in-Chief of the Colony of New South Wales and its Dependencies.

WHEREAS the Governor is empowered by Section 9 of the "Vegetation Diseases Act, 1897," from time to time, by Proclamation in the *Gazette*, to declare any fungus or vegetable parasite whatever to be a fungus within the meaning of the said Act: Now, therefore, I, HENRY ROBERT, VISCOUNT HAMPDEN, the Governor aforesaid, with the advice of the Executive Council, do, by this my Proclamation, declare Black Spot (*Fusicladium*) to be a fungus within the meaning of the said Act.

Given under my Hand and Seal, at Government House, Sydney, this twenty-second day of December, in the year of our Lord one thousand eight hundred and ninety-eight, and in the sixty-second year of Her Majesty's reign.

By His Excellency's Command,

JOSEPH COOK.

GOD SAVE THE QUEEN!

Department of Agriculture,
Brisbane, 25th May, 1899.

HIS Excellency the Governor, with the advice of the Executive Council, has, in pursuance of the provisions of "*The Slaughtering Act of* 1898," been pleased to make the following Regulations.

J. V. CHATAWAY.

REGULATIONS UNDER "THE SLAUGHTERING ACT OF 1898."

Definitions.

1. Save as herein otherwise provided, in these Regulations the terms used have the meanings respectively assigned to them by "*The Slaughtering Act of* 1898."

The term "Stock" means and includes cattle, sheep, and swine;

The term "Licensing Court" means a Police Magistrate or if he is absent or there is no Police Magistrate, then any two justices sitting in a Court of Petty Sessions having jurisdiction in the district within which a slaughter-house is or is proposed to be established;

The term "Inspector" means the inspector (if any) to whom a district is assigned, or if he is absent, or there is no such inspector then any inspector appointed under the provisions of "*The Slaughtering Act of* 1898";

The term "Owner of stock" means the owner whether jointly or severally of the stock, or the authorised agent or superintendent of the owner, or the drover or person in charge of the stock.

Unlicensed slaughter-house.

2. Any person who establishes or keeps an unlicensed slaughter-house is guilty of an offence against these Regulations.

Illegal slaughter.

3. No person shall slaughter at any place other than at a licensed slaughter-house any stock the flesh of which is intended to be used for meat.

Licensing Court.

4. Subject to these Regulations, the Licensing Court may license slaughter-houses established or proposed to be established within a district.

Application.

5. Every person who desires to obtain a license or the renewal of a license for a slaughter-house shall make an application therefor in writing in the form in the First Schedule hereto or to the like effect.

Time for applying.

6. Every application shall be addressed to the Licensing Court of the district within which the slaughter-house is or is proposed to be established, shall be lodged with the proper Clerk of Petty Sessions, and shall be accompanied by the license fee hereinafter prescribed. Applications for licenses shall be so lodged on or before the fourteenth day of December, March, June, and September in each year. Applications for the renewal of licenses shall be so lodged on or before the fourteenth day of December in each year.

Duty of clerk of petty sessions.

7. Upon the receipt of every such application, the clerk of petty sessions shall forthwith forward a copy of the same to the local authority of the district and also to the inspector.

Representatives of local authority.

8. The local authority of the district may make to the Licensing Court such representations, in writing or otherwise, with respect to every such application, as the local authority thinks fit.

Report of inspector.

9. It shall be the duty of the inspector, upon the receipt of every such copy of an application, to inspect the premises in respect of which a license or the renewal of a license is applied for, and to report thereon to the Licensing Court. He shall either make such report in writing under his hand, or, if directed so to do by the chief inspector, shall personally attend at the sittings of the Licensing Court, and there orally report to the Court upon the same.

The hearing.

10. The Licensing Court shall sit for the hearing and determination of all applications for licenses on the first Tuesday in the months of January, April, July, and October in every year.

The Licensing Court shall sit for the hearing and determination of all applications for the renewal of licenses on the first Tuesday in the month of January in every year.

After considering the report of the inspector and the representations, if any, of the local authority of the district, the Court may, subject to these Regulations—

(1) Grant the application; or
(2) Adjourn the application for the purpose of the execution by the applicant of such works as in the opinion of the Licensing Court are necessary to render the premises suitable and proper for the slaughter of stock; or
(3) Refuse the application.

Duration of license.

11. Save as hereinafter provided, a license for a slaughter-house shall remain in force for the period of one year, but may from time to time be renewed for a like period. Provided that a new license granted for a slaughter-house shall only remain in force until the sitting of the Licensing Court held in the month of January following the date on which such license was granted. Provided further that all existing licenses shall remain in force until the sitting of the Licensing Court held in the month of January next.

Fees for licenses.

12. The annual fee payable in respect of the license or the renewal of the license of a slaughter-house shall be twenty shillings.

Fees for defraying expenses.

13. The fees payable by the licensee of a slaughter-house for the purpose of defraying the expenses of inspection shall be as follows, that is to say:—

	s.	d.
For every bullock, steer, cow, or heifer slaughtered ...	0	3
For every 12 sheep or calves slaughtered	0	3
For every head of swine slaughtered	0	3

Such fees shall be paid by the licensee to the inspector monthly, or at such shorter intervals as the inspector may require.

Receipt.

14. The inspector shall, upon the payment of such fees, give to the licensee a receipt under his hand in the form of the Second Schedule hereto.

Delivery note.

15. When stock are delivered at a slaughter-house to be slaughtered, the owner of the stock shall deliver to the owner of the slaughter-house a way bill or delivery note of the stock, setting forth the number, the description, and the brands or marks of the stock, and signed by the owner thereof.

The owner of the slaughter-house shall retain and preserve every such way bill or delivery note, and shall, on demand, produce the same to the inspector.

Slaughtering book.

16. The licensee of every slaughter-house shall keep a book called a "Slaughtering Book," in which shall be correctly recorded all the particulars set out in the Third Schedule hereto; and such book shall be open at all reasonable times to the inspection of any inspector, or any inspector of brands or police officer, who may make any copy of or extract therefrom.

Floors.

17. The floor of every place in a slaughter-house where stock are pithed or slaughtered, or where meat is dressed, prepared, treated, or stored, shall, if required by the inspector, be constructed of concrete or otherwise rendered impervious, to his satisfaction.

Drainage; ventilation.

18. Every slaughter-house shall be drained and ventilated to the satisfaction of the Inspector.

Blood.

19. In every slaughter-house all blood shall be boiled, desiccated, or otherwise treated to the satisfaction of the Inspector.

Privies.

20. Every water-closet, privy, cesspool, and urinal used in connection with a slaughter-house shall be situated at a distance of not less than one hundred yards from any building, enclosure, or place in or at which stock are slaughtered or meat is dressed, prepared, treated, or stored.

Pigsties.

21. Every pigsty, enclosure, and place where swine are kept at a slaughter-house shall be situated at a distance of not less than two hundred and fifty yards from any building, enclosure, or place in or at which stock are slaughtered or meat is dressed, prepared, treated, or stored.

Offal to swine.

22. Swine shall not be fed with offal at a slaughter-house, nor shall any offal be removed therefrom for the purpose of feeding swine, unless such offal has first been thoroughly cooked.

Notice of slaughtering.

23. The owner of every slaughter-house shall give to the inspector such notice of his intention to slaughter stock as will enable the inspector to inspect such stock.

Tampering with meat.

24. Until stock slaughtered have been inspected by the inspector the pleuræ are not to be stripped or otherwise interfered with, and no part of the carcass is to be cut away, manipulated, or interfered with in any manner which may prevent the discovery of disease or may alter the true condition of the meat.

The inspector may condemn any stock or meat which in his opinion has been dealt with in contravention of the provisions of this Regulation.

Branding meat.

25. When the inspector has inspected any meat and approved of the same, he shall brand each separate quarter of beef and each carcass or quarter of mutton with a mark or stamp.

Any person who wilfully removes or obliterates any such mark or stamp, or who, not being an inspector, affixes or causes to be affixed to any meat any such mark or stamp, is guilty of an offence against these Regulations.

Calves.

26. Calves less than four weeks old are not to be slaughtered for meat.

Condemned meat.

27. Condemned meat at a slaughter-house shall be rendered unfit for the food of man in the mode directed by the inspector.

Removal of hides, &c.

28. Offal and the hides, skins, heads, and feet of stock slaughtered at a slaughter-house shall only be removed from the premises in the manner and at the times directed by the inspector.

The contents of paunches and of intestines shall be deposited in the place appointed by the inspector for the purpose.

Carriage of meat.

29. Meat shall be carried from the slaughter-house to the butcher's shop in vehicles approved by the inspector.

Every such vehicle shall be provided with a proper roof, and shall be so constructed as to permit of a free current of air.

Meat shall be carried in such vehicle either suspended from the roof or sides thereof, or so arranged that a free current of air may circulate between the carcasses or portions of carcasses being carried.

Blowing meat, &c.

30. No person shall blow with his breath or otherwise into any meat, or eject any salt, liquid matter, or other substance from his mouth thereon.

No person shall treat, dress, or prepare any meat by means of any preservative or other substance which, in the opinion of the inspector, injures, or is likely to injure, such meat or to render it unfit for the food of man.

Offences.

31. Any person who contravenes any of the provisions of these Regulations is guilty of an offence, and is liable to a penalty not exceeding fifty pounds.

When a licensee of a slaughter-house, having been convicted of an offence against "*The Slaughtering Act of* 1898" or these Regulations, is on a second or subsequent occasion convicted of an offence against such Act or Regulations, the Court, by or before whom he is so convicted as last aforesaid, may, in addition to the punishment for such offence, order the license of the slaughter-house to be suspended for such time as the Court thinks fit, or to be absolutely cancelled, and such license shall be so suspended or cancelled accordingly.

FIRST SCHEDULE.

APPLICATION FOR A LICENSE OR THE RENEWAL OF A LICENSE OF A SLAUGHTER-HOUSE.

"*The Slaughtering Act of* 1898."

To the Licensing Court for the District of [*name of District*].

I [*or* we] hereby apply to the Licensing Court to be holden for the district of [*name of district*] for a license [*or* the renewal of a license] of a slaughter-house proposed to be established [*or* established] at [*describe locality so as to clearly identify it*].

Dated at the day of

Applicant.

SECOND SCHEDULE.

RECEIPT.

"*The Slaughtering Act of* 1898."

I have this day received from [*name of licensee or licensees*] the sum of £ , being fees in respect of stock slaughtered at the slaughter-house at [*situation of slaughter-house*], whereof he is the licensee [*or* they are the licensees], between the day of and the day of .

The particulars of the stock are as follow :—

Cattle [*insert number*]
Sheep and Calves [*insert number*]
Swine [*insert number*]

Dated at the day of

Inspector.

THIRD SCHEDULE.

SLAUGHTERING BOOK.

Date of Slaughtering.	Number of Stock Slaughtered.			Person from whom Stock obtained.	Brands or Marks.
	Cattle.	Sheep.	Swine.		

REGULATIONS UNDER "THE SLAUGHTERING ACT OF 1898."

Department of Agriculture,
Brisbane, 15th November, 1899.

HIS Excellency the Lieutenant-Governor, with the advice of the Executive Council, has, in pursuance of the provisions of "*The Slaughtering Act of* 1898," been pleased to make the following additional Regulation.

J. V. CHATAWAY.

32. Clause 12 of the Regulations under "*The Slaughtering Act of* 1898," dated the twenty-fifth day of May, 1899, and published in the *Government Gazette* dated the twenty-seventh day of May, 1899, is amended by the addition of the following paragraph :—

Provided that the annual fee payable in respect of such license or renewal of such license issued to persons who only slaughter calves and pigs, but not exceeding five head in all in any week, shall be two shillings and sixpence.

By Authority : EDMUND GREGORY, Government Printer, William street, Brisbane.

DIRECTOR
BOTANIC GARDENS
MELBOURNE

Royal Botanic Gardens Victoria
RBG00019198